THE JOURNAL OF GAS LIGHTING
WATER SUPPLY & SANITARY IMPROVEMENT

VOL. LIV. No. 1371.] LONDON, AUGUST 20, 1889. [41ST YEAR. Price 6d.

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Warranted Free from Adulteration. **TORBAY PAINTS.**

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See Advertisement, p. 587.

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Seven Jetties on the River.
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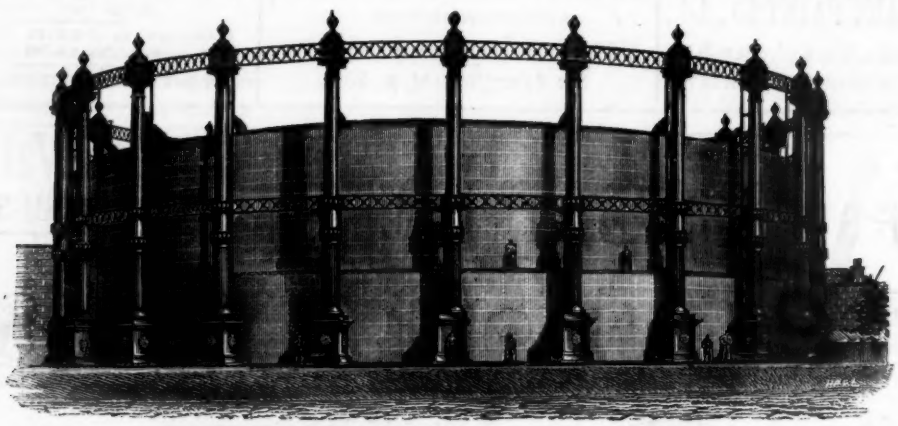

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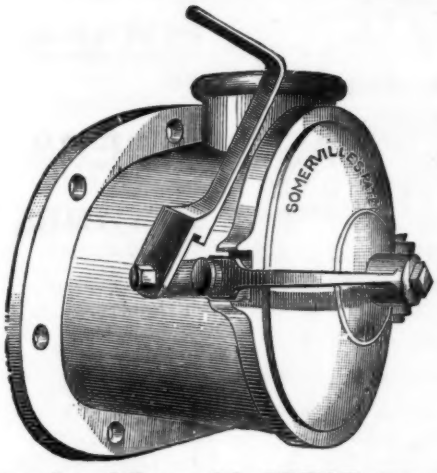

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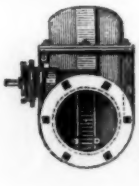

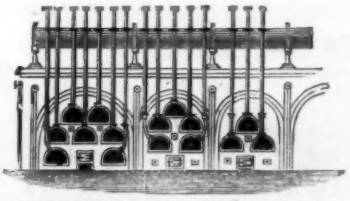

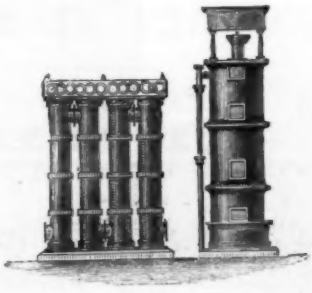

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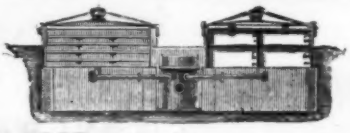

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100 Prize Medals.

MADE in SIZES
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GAS-ENGINES
COMBINED
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FOR
TOWNS SUPPLY,
SEWAGE, &c., &c.

GAS-ENGINES
COMBINED
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AIR COMPRESSORS
FOR THE
SHONE SEWAGE
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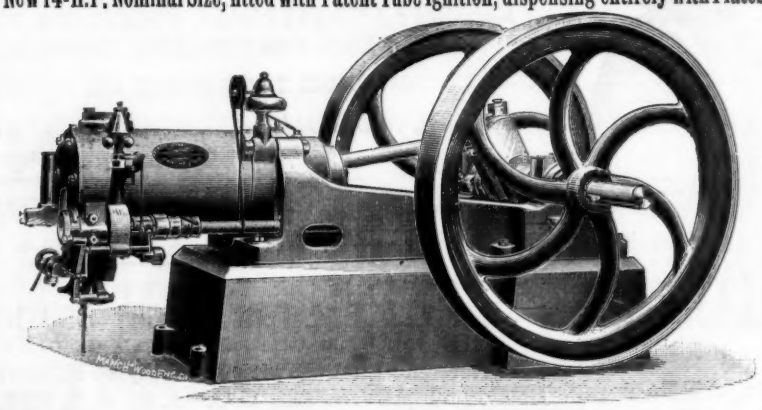
LIGHT, &c.

New 14-H.P. Nominal Size, fitted with Patent Tube Ignition, dispensing entirely with Plates.



MADE in SIZES
2-Man to 100-HP.

VERTICAL
AND
HORIZONTAL
TYPES.

ENGINES
COMBINED
WITH
HOISTS, PUMPS,
DYNAMOS, &c., &c.

Largely used for
EXHAUSTING,
PUMPING,
COKE CRUSHING,
ELECTRIC LIGHTING,
&c., &c.

Over 31,000 "OTTO" ENGINES are at work.

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MANUFACTURERS OF
FIRE-CLAY GAS-RETORTS, FIRE-BRICKS, LUMPS, & TILES of Every Description.
GLAZED BRICKS AND PORCELAIN BATHS.

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Engineers, Ironfounders, and Contractors,
GAS PLANT WORKS, NEWTON HEATH, MANCHESTER.

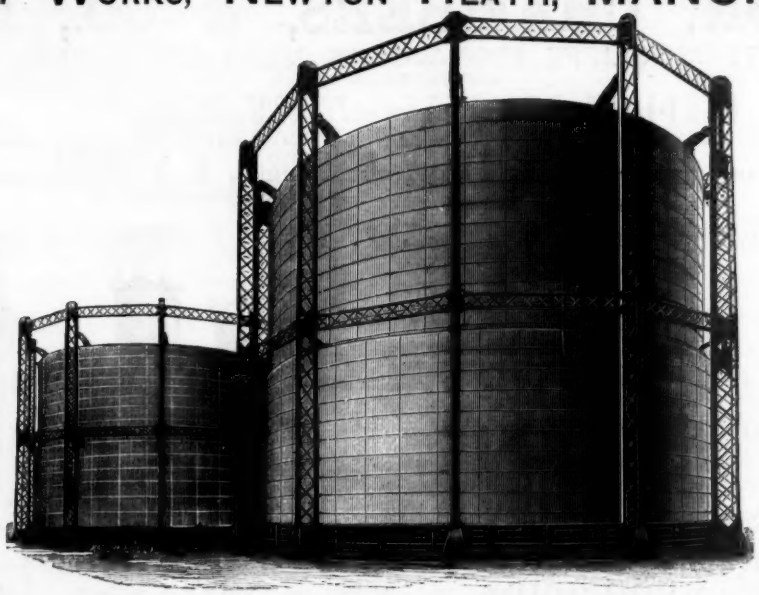

Illustration showing view of two Telescope Gasholders, each 65 feet diameter by 48 feet high, recently erected by Messrs. R. and J. Dempster, in Tanks previously occupied by Single-lift Holders 20 feet deep. The Tanks were made 4 feet deeper, by adding a Tier of Cast-Iron Plates, prepared with suitable Flanges, to meet the Brickwork of a Brick and Puddle Tank. The storeage capacity was thus increased nearly 150 per cent. at comparatively little outlay.

KIRKHAM, HULETT, & CHANDLER, Ld.,

PALACE CHAMBERS,

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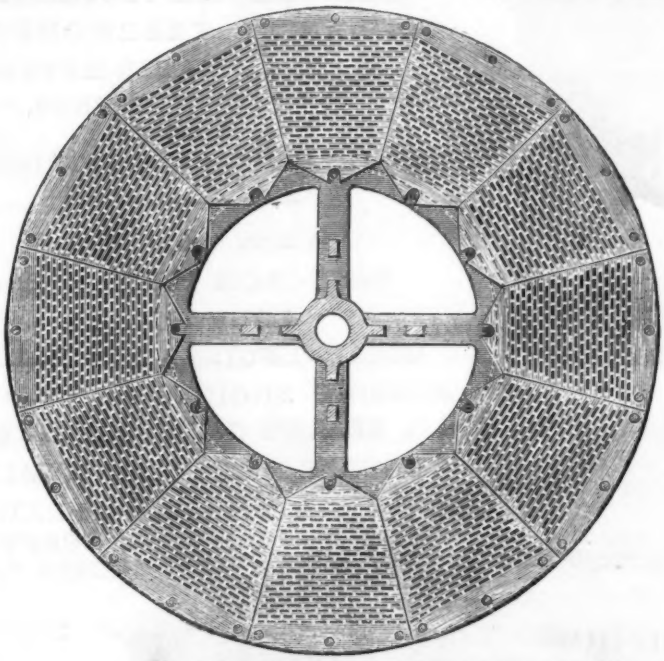
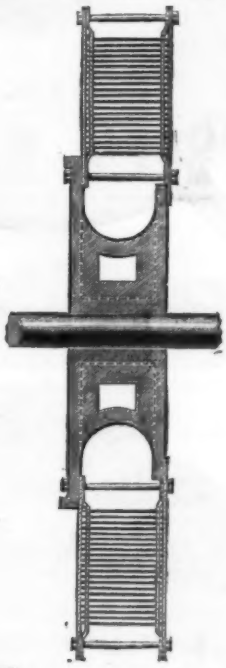
Mr. S. HERSEY, Managing-Director.

THE "NEW" PATENT

"Standard" Washer-Scrubber.





DETAILS OF WASHING DEVICES.

Thoroughly extracts every grain of Ammonia and a large quantity of other Impurities from Gas.

Has been for many months in successful and satisfactory operation at **The Gaslight and Coke Company's Station at BECKTON,**

Resulting in a second order just received to fit up a Washer-Scrubber, of 2½ millions capacity, upon this new principle, at the same station. Other orders for these machines are in course of execution.

A very large amount of patronage has been accorded the "Standard" Washer-Scrubber, of which, up till now, **367** have been supplied, representing a daily make of **318,260,000** cubic feet of gas; but the advantages of the **"New Standard"** will be readily recognized, and its superiority over the present "Standard" may be briefly summarized as follows:—

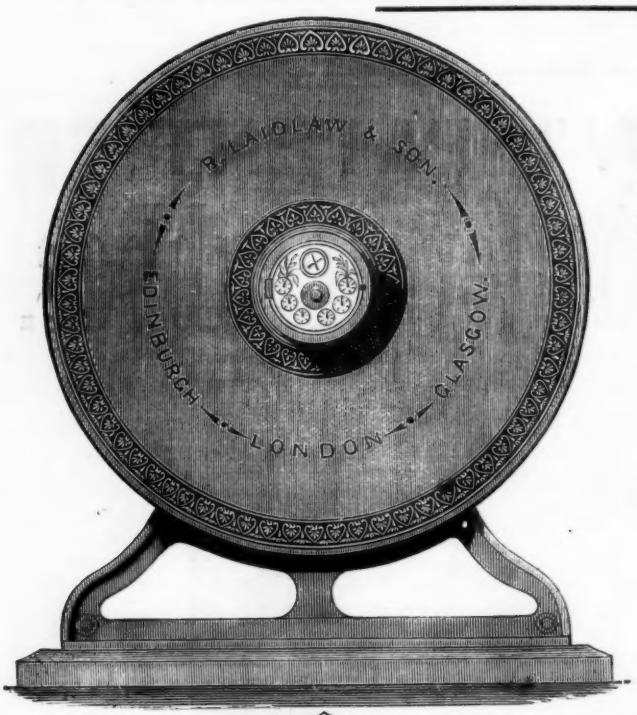
1. The weight in motion is **only one-seventh** of that in the present machine.
2. It requires **only one-seventh** the power to drive; consequently effecting a large reduction in cost of Engine as well as in steam power.
3. **The Wear and Tear is enormously reduced,** as the Shaft has comparatively little weight to carry.
4. It has been found that the washing surfaces **keep perfectly clean** and free from deposit from end to end of the Machine.
5. It is so constructed that it forms a most powerful, effective, and complete system of purification, gives no pressure, and can be removed and replaced without trouble or injury.
6. The "New Standard," owing to the foregoing, can be supplied at **a large reduction in price.**

Engineers desirous of working Ammoniacal Liquor over and over again prior to leaving the "New Standard" can do so by the automatic and simple arrangement which forms part of this Patent.

The Apparatus can be applied to "Standard" Washer-Scrubbers already in use.

Particulars will be furnished upon application to the above address.

R. LAIDLAW & SON'S
STATION METERS
IN ROUND OR SQUARE CASES, ALL SIZES.



Makers in EDINBURGH of

WET AND DRY GAS-METERS,
IMPROVED STATION GOVERNORS,
PRESSURE REGISTERS,
(To Indicate New Time),
PRESSURE GAUGES, TEST HOLDERS,
EXPERIMENTAL HOURLY-RATE METERS,
EXPERIMENTAL TEST-METERS,
CONDENSER THERMOMETERS,
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STREET LANTERNS,
AND ALL KINDS OF
GAS APPARATUS AND FITTINGS, &c.

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CAST-IRON PIPES (all Sizes),
LAMP PILLARS,
STEAM-ENGINES AND BOILERS,
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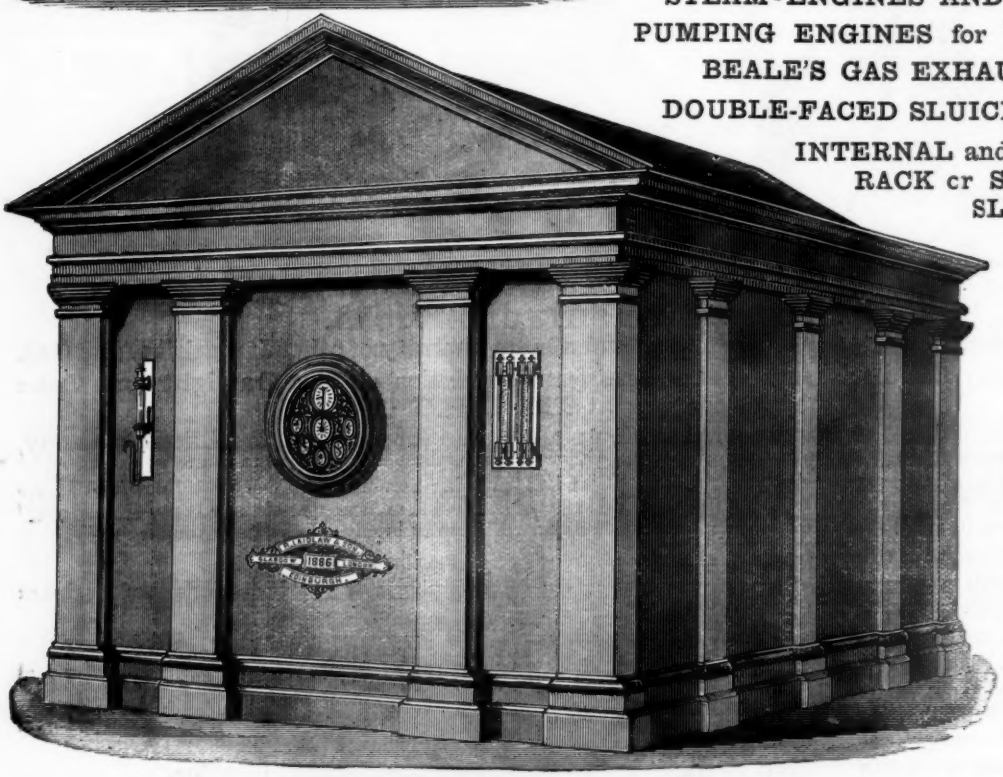
BEALE'S GAS EXHAUSTERS,
DOUBLE-FACED SLUICE VALVES,
INTERNAL and EXTERNAL RACK cr SCREW SLIDE VALVES,
CAST-IRON COLUMNS,
BEAMS, GIRDERS, and WATER TANKS.
WROUGHT-IRON TUBES, FITTINGS, &c.



Descriptive Price Lists, Estimates, & full particulars forwarded on application.

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IMPORTANT TO
GAS ENGINEERS AND GAS MANAGERS:

The most Economical, Reliable, and Handy Tool for Forge Work for

ENGINEERS, MACHINISTS, TOOL MAKERS, FITTERS, FORGERS, STAMPERS, COACH BUILDERS,

AND FOR USE IN

GAS-WORKS, SMITHIES, IRON-WORKS, COLLIERIES, &c., &c.,

IS

THE TANGYE GAS-HAMMER

(ROBSON & PINKNEY'S PATENTS)

As supplied to several of the principal Gas-Works.

TANGYES LIMITED
SOLE MAKERS.

As supplied to several of the principal Gas-Works.

Hand Gear.

Foot Gear.

(From Photos of the ¾ cwt. size.)

THE above illustrations represent THE TANGYE GAS-HAMMER AS NOW made. Since its introduction it has been greatly improved both in design and simplicity of working. It has also been constructed to work either with Hand Gear or with Foot Gear.

This—the first Gas-driven Forging Hammer introduced—was designed, and at first recommended only for use in cases where steam was not available or could only be employed at great expense, but the data given below and which are founded upon reliable and sustained test and trial, demonstrate that the **GAS-HAMMER** may be economically used in competition with the Steam-Hammer, even in places where the price of gas is at its highest.

"*Since the appearance of our* ['*The Engineer*'] *notice, the Hammer has been in some respects re-modelled, and its remarkable economy placed altogether beyond a doubt. . . . The Hammer described is that known as the ¾ cwt. size, and has a cylinder of 7 in. diameter and 6½ in. stroke. The maximum blow is very nearly that which would be given by* **a weight of 3 cwt. falling through a height of 1 ft.**; *and this can be repeated at the rate of* **110** *blows per minute. . . . Extended test in practical smith work has demonstrated that over* **2500 of the heavier blows** *referred to above, can be given with* **one pennyworth of gas** *at half-a-crown per* 1000 *feet—i.e., the Birmingham price to small consumers—or over* 4500 *varying blows for the same consumption.*"—"**The Engineer,**" **Sept. 10, 1886.**

The Gas-Hammer dispenses with Boilers, Coals, Ashes, and Dirt necessitated by Steam-Hammers.

It is ready for work at any moment, day or night, and works as economically for a few minutes' spell as when in sustained operation.

PRICE LISTS AND FULL PARTICULARS ON APPLICATION.

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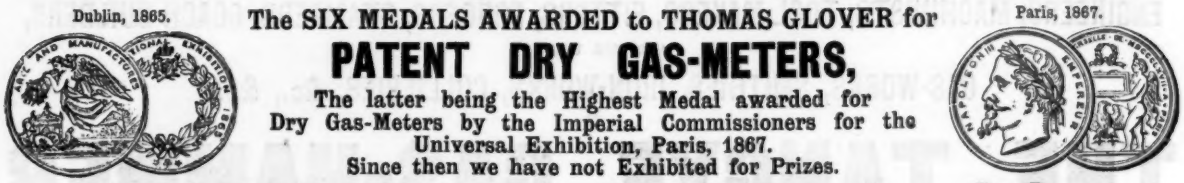

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PATENT DRY GAS-METERS,

The latter being the Highest Medal awarded for Dry Gas-Meters by the Imperial Commissioners for the Universal Exhibition, Paris, 1867.
Since then we have not Exhibited for Prizes.

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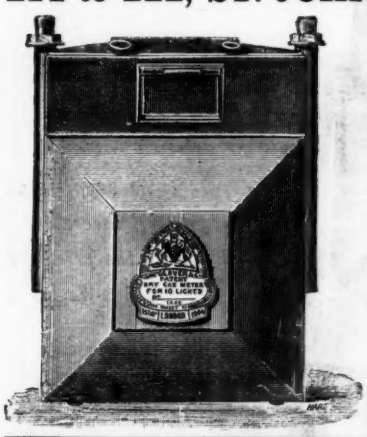

1st—Are a remedy for all the defects of Wet Meters.
2nd—Are suitable for all climates, whether hot or cold.
3rd—Incur no loss of Gas by Evaporation.
4th—Cannot become fixed by frost, however severe.
5th—Are the most accurate & unvarying measurers of Gas.
6th—Prevent jumping or unexpected extinction of the Lights.
7th—May be fixed either above or below the level of the lights.
8th—Cannot be tampered with without visibly damaging the outer case.
9th—Will last much longer than Wet Meters.
10th—Will not cost more than one-half for repair that Wet or Water Meters do.
Are upheld for five years without charge.

Meters fitted with Grey's Index or Harding's Counter.

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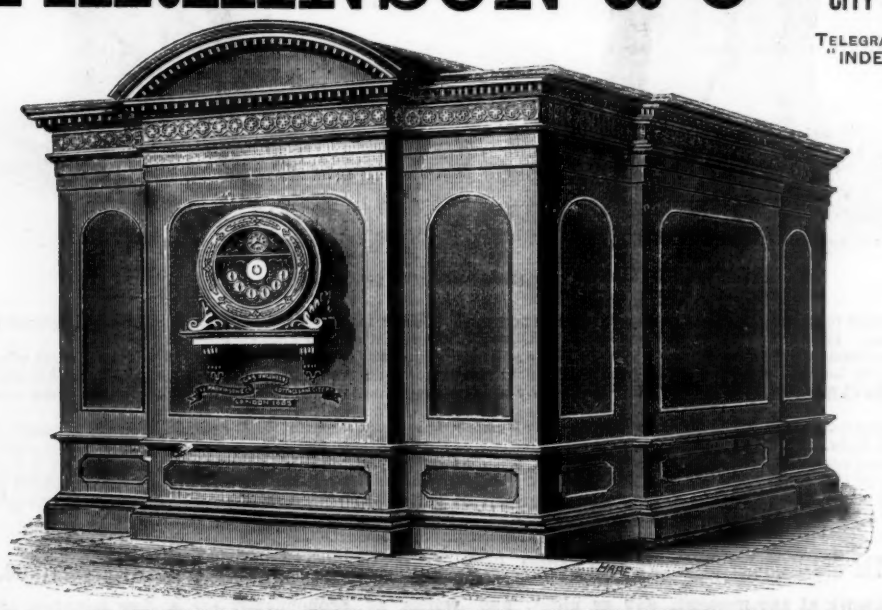

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W. PARKINSON & CO. have introduced the above design of Station Meter in order to meet the demand for a more ornamental Tank. It is simpler in construction than No. 1 Pattern, and consequently less in cost. All joints are planed, the most modern improvements introduced, and the entire Meter is of the strongest and most substantial description.

FITTED WITH

PARKINSON'S PATENT THREE-PARTITION MEASURING DRUM.

MATERIALS and WORKMANSHIP of the VERY BEST QUALITY ONLY. PRICES, &c., ON APPLICATION

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CONTENTS.

EDITORIAL GAS—*Gas Lighting, &c.* :— PAGE
The South Metropolitan Meeting—The Two Great London Gas Companies and their Mutual Relations . . . 349
The Judgment in the Great Districting Case . . . 350
The Latest Phase of the Salford Scandal . . . 350
The Meeting of the North of Ireland Gas Managers . . . 351
Water and Sanitary Affairs :—
Projected Extension of the Bradford Water-Works . . . 351
ESSAYS, COMMENTARIES, AND REVIEWS :—
Gas and Water Companies in the Stock Market . . . 352
Electric Lighting Memoranda . . . 352
The Cupola Form of Gas-Producing Apparatus . . . 353
COMMUNICATED ARTICLE :—
The Chemistry of Illuminating Gas. By Norton H. Humphrys, Assoc. M. Inst. C.E., F.C.S. . . . 354
TECHNICAL RECORD :—
North of Ireland Association of Gas Managers—Annual Meeting at Dundalk—
Inaugural Address by Mr. W. B. Featherstone . . . 356
Mr. W. S. Stormonth on Introducing Gas-Stoves . . . 357
Mr. T. Frizelle on Unaccounted-for Gas . . . 358
North British Association of Gas Managers—The Annual Meeting at Dunfermline—Mr. J. Hall on Purifiers . . . 360
REGISTER OF PATENTS :—
Starting Gas-Engines—Preis, E. F. . . . 362
Gas-Regulators—Leisner, H. . . . 362
Gasholder Guiding Apparatus—Livesey, G. T. . . . 362
Gas-Lamps—Rey, H. . . . 362
Regenerative Gas Lamps—Stern, W., and Mucke, J. . . . 363
Patent Notices . . . 363
CORRESPONDENCE :—
Outside Stopcocks and Water-Waste Detectors . . . 363
Mr. F. Lennard's Process for the Continuous Distillation of Tar . . . 363
PARLIAMENTARY INTELLIGENCE :—
House of Lords—Private Bills (Alteration of Memorandum of Association); Electric Lighting Provisional Orders Bills; The Proceedings at the Electric Lighting Inquiry . . . 364
House of Commons—Government Departments (Transfer of Powers) Provisional Order Bill; The Salford Gas Scandal . . . 364
MISCELLANEOUS NEWS :—
Meeting of the South Metropolitan Gas Company . . . 365
Provincial Gas and Water Companies . . . 366
Croydon Commercial Gas Company—The Directors' Half-Yearly Report. 368
Meeting of the Cork Gas Consumers' Company . . . 368
Meeting of the Yorkshire Water Gas Company, Limited . . . 368
Bradford Corporation Gas Supply—The Half Yearly Balance-Sheet . . . 368
The Salford Gas Scandal—Settlement of the Civil Actions against Hunter; A Petition to Mitigate his Sentence . . . 369
The Extensions at the Ilkeston Corporation Gas-Works—A Question of the Payment of the Engineer for Extra Services . . . 370
Bradford Corporation Water Undertaking—The Official Reports on the Proposed Additional Sources of Water Supply . . . 370
Nottingham Corporation Water Supply—The Annual Reports . . . 371
Worcester Corporation Water Undertaking—The Projects for Augmenting the Supply . . . 372
Wolverhampton Corporation Water Supply—The Annual Report . . . 372
Coventry Corporation Water Supply—Proposed New Reservoirs . . . 372
Water Undertaking of the Barry and Cadoxton Gas and Water Company 372
Notes from Scotland . . . 373
Current Sales of Gas Products . . . 374
Gas and Water Companies' Stock and Share List . . . 374
Visit of Mr. G. C. Trewby to America, 352—Projected Trial of M. Coze's System of Inclined Retorts at Brentford, 352—The Managership of the Heywood Gas-Works, 352—The City Surveyorship of Carlisle, 354—American Gaslight Association, 354—Adoption of the Eight-Hour System at the Swansea Gas-Works, 354—Mr. Ellis Lever and the Manchester Gas Committee, 354—The Forthcoming Meeting of the British Association, 361—San Paulo Gas Company, Limited, 364—The Water Gas Explosion at Hull, 364—Bromley (Kent) Gas Company, 364—Stockton and Middlesbrough Water Board, 367—Extension of the Abyssinian Tube-Well System at Swansea, 367—The Cardiff Water-Works and Commoners' Rights, 367—The Gas Supply of Brooklyn, 369—Gas at the Birmingham Electrical Exhibition, 369—Electric Light Works and "Horrible Smells," 369—Northern Coal Trade, 369—Gas *v.* Electric Light at Brymbo, 369—Rosario Water-Works (New) Company, Limited, 370—New Filter-Beds for the Bradford Corporation, 372—Brush Electrical Engineering Company, Limited, 372—The Oswestry Town Council and the Liverpool Water-Works, 372—Nelson Local Board Gas Supply, 373—The Public Lighting of Worcester, 374—The Proposed Transfer of the Bournemouth Gas and Water Works, 374—The Expenditure on the Vyrnwy Works, 374—The Eight-Hour Movement at Birmingham, 374—The Public Lighting of Wandsworth, 374—Additional Storeage Accommodation for the Devonport Water Company, 374—The Agitation among Gas Stokers, 374—Proposed Electric Lighting of the Friern Barnet District, 374.

TO ADVERTISERS.

ADVERTISEMENTS for the next number of the JOURNAL must be received by Monday, 12 o'clock noon, to ensure insertion; but as the Advertisement sheet of the JOURNAL is sent to Press the first thing on Monday Morning, Advertisers will please bear in mind that Orders for Alterations in or Stoppages of PERMANENT Advertisements should be received Not Later than Two o'clock on SATURDAYS.

THE JOURNAL OF GAS LIGHTING,

WATER SUPPLY, & SANITARY IMPROVEMENT.

TUESDAY, AUGUST 20, 1889.

THE SOUTH METROPOLITAN MEETING—THE TWO GREAT LONDON GAS COMPANIES AND THEIR MUTUAL RELATIONS.

THE South Metropolitan meeting has been held, and consequently students of the gas politics of London have now before them, in this and the last issue of the JOURNAL, the usual parallel statements of the two Chairmen of the most important Metropolitan undertakings wherewith the customary stereoscopic view of the gas affairs of the capital may be compounded. It is practically impossible to take Colonel Makins's semi-annual statements without reflecting that his remarks upon some subjects will in all probability be supplemented within a week by some independent observations from Mr. George Livesey; and when Mr. Livesey speaks in his turn, one naturally thinks of what the Governor of the Chartered Company had to say shortly before upon the same heads. This time it happens that the speeches of the two Chairmen are linked together by at least one common topic—the lawsuit between the Companies, which we have dealt with in another paragraph. In separating this subject from our commentary upon what was said and done at the South Metropolitan meeting, we had the object of stating the judgment of the House of Lords independently of any special interest, and purely as an exposition of the law of gas supply. This leaves us free to discuss it now in its special bearings upon the two Companies concerned; and in so doing there is no option but to follow the expressions of Mr. Livesey. The judgment was being actually delivered at the time when Colonel Makins was conducting the proceedings at the Chartered meeting; and he could therefore do nothing more than announce to the assembled proprietors the bare fact that the decision was going in their favour. Notwithstanding that there was no time for comment, however, there was ample opportunity for glorification, if Colonel Makins had yielded to any such temptation; and it is to be recorded to his credit that he did not utter a word to taunt the losing side with their defeat. This forbearance enables one to accept with some hope the remarks of Mr. Livesey respecting the possibility of the result of the recent action proving a bond to unite, instead of a cause to further divide the responsible administrators of the two Gas Companies. It cannot be ignored that the Chartered and the South Metropolitan people have not, up to the present time, worked together as fraternally as might be desired. It was a recognition of this truth that inspired somebody a short time since with the burlesque idea that a good many hitches and difficulties would be prevented by hanging Colonel Makins and Mr. George Livesey upon two gallows to be erected for the purpose; the subtle imputation that these presumed incompatibles would not even agree to be hanged upon the same tree, not being the least significant feature of the proposal. Apart, however, from the reckless wastefulness of this project to terminate the careers of two eminently useful gentlemen, for the purpose of extinguishing a few apparent divergencies of policy, it is by no means clear that either Colonel Makins or Mr. George Livesey is wholly responsible for the disagreements of the two industrial organisms of which they are the official heads. Even if it is conceded that Mr. Livesey is so identified with the South Metropolitan Company that there is no need to look beyond or behind his personality for the springs of South Metropolitan policy, the same cannot well be said of Colonel Makins for the Chartered Company. No Governor of this Company for many years had stood for the Company in the general estimation; and it would not be easy to say who does occupy this not wholly enviable position. Colonel Makins, of course, is to be reckoned with, and so must be the Deputy-Governor, Mr. Howard Charles Ward. Nobody is likely to overlook or minimize the influence of Mr. J. Orwell Phillips, the Secretary and General Manager; but there are not lacking indications to show that even he has a "tail" that is not always powerless to "wag" him. There is no necessity to mention any more names; but it is easy to see that when two parties or corporations are at variance, the more members there are to reconcile to a new policy the more difficult it is to bring the reconciliation about.

Yet that a better feeling between the heads of the two concerns is eminently desirable, for their own good and the benefit of the gas industry generally, does not admit of argument. The desirability of such a change lies upon the surface; and anybody who should say that the two Companies ought to be kept at cross-purposes would stand confessed a traitor. But nobody is at all likely to make such a statement in so bold a fashion. In this, as in so many other human concerns, it is not confessions of faith or professions of principle that are important, but the actions that spring from secret feeling. As in high politics, it is useless to conclude flourishing treaties between professedly friendly nations if each is to go on cutting the other's throat commercially, and giving aid and countenance to the other's enemies. It is very pretty for Colonel Makins to shake hands, physically and oratically, with Mr. Livesey, and for Mr. Livesey to return his compliments; but what the shareholders of the two Companies are much more concerned with is to know how and why it is that each Company persistently takes its own line, regardless of all others, in such matters as gas testing, rating appeals, dealings with the local authorities, workmen's agitations, and the like. Surely, common sense would say, there must be many points with regard to which the London Gas Companies might advantageously concert a policy, and adopt lines

of common action, without going to the extremes of amalgamation or cut-throat competition. But instead of this, they do nothing of the kind, although only within the past few weeks their own workmen have taught them a sharp lesson as to the immense value of union. Even when they admit a common view, they never attempt to give it the force of a common agreement. Take the instance of the declared partiality of the County Council for the legalization of the portable photometer. All three Companies would protest against this project, and the principle (as stated by us last week) which it covers. They would also declare severally that the establishment of uniformity in the design of photometers is desirable; but there the matter ends. Will any steps be made to take united action in regard to these points of common policy? The Chartered must lead the way, because they are the biggest, the oldest, and in every sense the most seriously concerned for the issue. If the Chartered administrators abandon their isolation, nobody will dispute their right to lead; but if they continue to "fight for "their own hand," as though inspired with a spirit of haughty self-sufficiency, they must not complain if the others go on their own way, and carry out schemes of defence which, because they are not comprehended in the Chartered programme, may appear opposed to it. If the regrettable indifference of the London Gas Companies to each other's cause (which is the cause of all) is to terminate, it must be by the action of the Chartered, whose position gives them the responsibility of the initiative.

Practically, it is in the light thrown by the House of Lords' judgment upon the desirability of union among the London Gas Companies that its importance to them consists. As Mr. Livesey remarked to the South Metropolitan shareholders last Wednesday, the supply of a railway goods-yard is a small matter to them. He was laudably anxious to place upon record the fact that in doing as they did with regard to supplying the London and South-Western Railway Company, they acted in accordance with their interpretation of the law, and in agreement with their own commercial practice. The 5 per cent. discount, to obtain which the Railway Company left the Chartered, was not a bait specially manufactured for the occasion, but was an ordinary thing in the South Metropolitan district. They had the frontage of the goods-yard; and there is reason to think that the Lord Chancellor was under a misapprehension in this regard, which morally vitiated his conclusions. However, the thing is done for good and all; and no useful purpose would be served by convicting the House of Lords of error in interpreting the Districting Act. It is well, notwithstanding, to make a note of anything that goes to explain the circumstances of this most remarkable case and judgment.

THE JUDGMENT IN THE GREAT DISTRICTING CASE.

Upon further consideration of the judgment of the House of Lords in the appeal of The Gaslight and Coke Company against the South Metropolitan Company, with reference to the supply of gas to the Nine Elms Goods Yard of the London and South-Western Railway Company, we find little to add to the remarks on the subject which appeared in last week's Journal. It is a consolatory element of these appeals that by the time they come up for decision, all feeling has evaporated from the respective contestants, and the issue can be awaited by them almost as dispassionately as by the counsel engaged in the case. The great point to be regarded by statutory suppliers of gas, in view of this judgment, is that, when they happen to be requested to serve a consumer on the verge of their district, they must take cognizance of the circumstances of the individual case, in view of what the Lord Chancellor called the intention of the Legislature in granting to them the virtual monopoly of their district, and a similar monopoly to their neighbours similarly situated, if any. If the consumer requires a supply larger than ordinary circumstances would appear to warrant, the suppliers of gas whom he may prefer must compel him to show that, in acceding to his demand, there will be no infringement of the districting law. It would appear that for filling balloons, or charging portable reservoirs (as for railway-carriage lighting), the consumer may exert a right of preference; but that for the ordinary purposes of what may be called localized or territorial consumption, he has no such right. There does not appear to be any escape from this position, with all its awkwardness. The only course to follow for a statutory Gas Company situated like the South Metropolitan Company, when the Railway Company demanded an additional supply, as in the case in point, will be to refuse, and let the applicants seek their remedy where they can find it. No amount of argument can shift the position; and therefore we prefer to leave it where it is. Before consigning this particular "modern instance" to history, however, it is necessary to point out that the Lord Chancellor appeared to be in error respecting which of the parties really had the frontage of the disputed territory, under the Districting Act. There is evidence to show that it was the South Metropolitan Company which had this position; and therefore, according to the Lord Chancellor's own words, the decision ought to have been for them, instead of for the other side. Lord Herschell again seems to have gone distinctly astray in his interpretation of the terms of the Act of 1860, which defines "premises" to include "lands"—a much wider definition than he adopted. All this, however, applies to the case itself, more than to the general effect of the decision respecting the meaning of gas "supply" as distinct from "measurement."

THE LATEST PHASE OF THE SALFORD SCANDAL.

It is reported upon the best authority that a very peculiar arrangement is on the point of being concluded by the Salford Corporation, with respect to the civil actions which they have been prosecuting for the recovery of the money alleged to have been wrongly obtained by Samuel Hunter, in his capacity of Manager of the Salford Gas-Works. It is that a sum of £10,000 has been, or is to be paid to the credit of the Corporation by Hunter, or by Hunter "in conjunction with "various other defendants," to settle the actions. At the same time, a petition for mitigation of Hunter's punishment has been "influentially signed" in Salford, and forwarded to the Home Secretary. The news of this little scheme has been received in the town with mixed feelings. On the one side are to be found those who think £10,000 in the hand is better for the ratepayers than double as much, together with any possible retributive exposures, in the bush. On the other hand, there are many who think that a matter of this kind is not to be settled in consideration of a payment which may represent 3d. in the pound to the ratepayers, but which leaves everything else in mystery. It is impossible to hold, upon any pretence of principle whatever, that a public corporation ought to be content with any amount of hush-money in connection with such proceedings as those which have recently made the name of Salford only too notorious. We have no hesitation in declaring that the Salford Corporation ought not to value £10,000, or ten times this sum, against the prospect of clearing up the whole wretched system of business in which their late Gas Manager and others unknown were involved. Either they have a reasonable prospect of doing this, or they have not. If they are in the former case, they have no right to barter the interests of the ratepayers for any given sum; and if in the latter, it is difficult to believe they could squeeze a farthing out of those who confess to having robbed the town. Consequently, the people will prefer to think that the Corporation must have the delinquents at a disadvantage—that they must, in short, be in possession of positive evidence of the delinquency; and it therefore comes back to the point that right should be done to the uttermost. If the arrangement in question should be carried out, nobody will be cleared; everybody who once did business with the Gas Committee in Hunter's time will remain under suspicion; and the small *solatium* of which the Corporation now think so highly will be forgotten. It appears to us that anybody who could support the idea of settling the Hunter affair for a money payment must utterly fail to realize the aspect in which the matter is viewed by the community. As we take it, it is not so much a question of punishing Hunter in person or pocket, or making the iniquitous contractors "disgorge," as of eradicating a vicious system, purifying trade, and re-establishing the good name of Salford. Hunter was doubtless an offender; but he was also a victim and a symptom. The venal traders with whom he trafficked were no worse than he, and no better; and there is no justice in heaping all the obloquy and all the penalties upon the one man who had the misfortune to be found out. Who are they that are alleged to be acting "in conjunction" with Hunter in finding this £10,000? The public have a right to know. This is a matter that does not affect Salford alone. Other places have an interest in learning whether traders who do business elsewhere as well as in Salford, also applied in their general transactions the same methods that they pursued with Samuel Hunter. It is a common saying, when the Salford scandal is named, that Hunter

could not have done as he did for so long but for the existence of a low standard of honour among those in whose good graces it was necessary for him to stand. The readiness of the Salford Corporation to accept hush-money now, after all that has passed, will tend to confirm this idea.

THE MEETING OF NORTH OF IRELAND GAS MANAGERS.

The North of Ireland Association of Gas Managers had a successful, and even enthusiastic meeting at Dundalk, last Tuesday, under the presidency of Mr. W. B. Featherstone, of that town. A very interesting part of the general business was the discussion respecting the suggested change of the name of the Association, by omitting the limitation to the North of Ireland, and thus making it National. The territorial limitation was brought about in the most natural way possible—from the circumstance that the founders were, as a matter of fact, resident in the northern part of the country. It now appears that some gas managers occupied in other localities wish to join, but do not see their way to doing so while it retains its restricted geographical appellation. In these circumstances, the present members have taken a very sensible resolve. The Committee are now to communicate with every gas manager in the country whose address they can find, and ask his opinion upon the matter. If the replies warrant a change in the name of the Association, it will be made; if not, and seeing that the great majority of the present members are engaged in the North of Ireland, the name of the Society will remain what it is, and we presume its meetings will also be restricted to this part of the country—although, of course, there will be no objection to enrol members from other districts. The question of localization or nationalization, however, is for the Irish Gas Managers to settle for themselves; but having already expressed an opinion upon the point, we do not yet find any reason to change it. Whether there is or is not a demand or a scope for a National Irish Association of Gas Managers is a question that should be kept distinct from that of the continued existence of the northern organization. An Association which, as we have already pointed out, is limited in its itinerancy to a circuit capable of being reached by the majority of the members within a half-day's, or at the most a day's journey out and in, has a distinct character from one that involves long railway journeys and hotel expenses. The less outlay there is in connection with these local societies the more useful they are likely to become. The advice we should be disposed to offer to our Irish friends upon this matter would, therefore, be—"Form your National Association if there is a demand for "one, and good luck to you and it; but do not sacrifice your "snug little local Society for it." Some very useful papers were read at the recent meeting; and the presidential address was well suited to the occasion and the auditory. Altogether, there is every indication that the North of Ireland Association supplies an acknowledged want, and that it has a beneficial future before it. The President for the ensuing year is Mr. A. Gibb, of Newry, in which town the next meeting is to be held; while Mr. J. Whimster, of Armagh, to whose untiring exertions much of the success hitherto attained by the Society is undoubtedly due, is retained in his responsible position of Honorary Secretary and Treasurer.

Mr. Jabez Church, M. Inst. C.E., F.G.S., has been elected a Director of the Hornsey Gas Company, in the place of Mr. A. C. Tatham, deceased.

We understand that Mr. Corbet Woodall, C.E., leaves England on Saturday next for the United States, on an important professional mission connected with the great modern development of gas lighting enterprise in North America.

Mr. T. Duxbury, Manager of the Darwen Corporation Gas-Works, had a little adventure while staying in a Blackpool lodging-house a few days ago. One of the other visitors in the house accidentally upset a spirit-lamp, setting fire to the curtains and other inflammable material in the bedroom. Considerable alarm prevailed; but the fire was fortunately extinguished by Mr. Duxbury before any considerable damage had been done. Mr. Duxbury was, however, rather seriously burned, and had to receive surgical treatment.

Last Thursday the House of Commons was occupied with the consideration of a number of amendments to the Standing Orders. Among them was an addition to No. 62 (as to obtaining the consent of the shareholders of companies in the case of Bills which have passed the first reading), as follows:—"So far as any such Bill relates to a separate undertaking in any company as distinct from the general undertaking, separate meetings shall be held of the proprietors of the company and of the separate undertaking; and the provisions of this Order applicable to meetings of proprietors of the company shall, *mutatis mutandis*, apply to meetings of proprietors of the separate undertaking."

Water and Sanitary Affairs.

At a special meeting to be held to-day, the Bradford Town Council are to take into consideration the report of their Committee with respect to the extension of the Corporation water-works. The recommendation of the Committee is in favour of what is known as the Nidd scheme, estimated to cost £1,222,000 when fully carried out; but it is proposed that the works shall be executed, as required from time to time, in six instalments—the first outlay being £388,000. The total supply obtainable from the new works, when all are complete, is estimated at 16,800,000 gallons per day. What is called the Grimwith scheme has been advocated by some parties in preference to that of the Nidd. The final cost of this latter project would be less than that of the former; the estimate being £719,000. But the supply would be only 10 million gallons per day; so that *pro ratâ* the expense is much the same. The requirements of Bradford are large, and are growing rapidly. In 1856 the consumption was only 500,000 gallons per day; and the yearly revenue, £10,225. Last year the daily supply was a little more than 10 million gallons, with a revenue of £112,424. The population to be supplied at the present time is 405,000, including 170,000 residing out of the borough. For domestic purposes, it is reckoned that this population ought to have 8,100,000 gallons daily. As that is only 20 gallons per head, it cannot be considered excessive, judged by the Metropolitan standard. For trade purposes, four million gallons per day are needed; making the daily supply for all purposes under 30 million gallons per head, as compared with over 30 million gallons in London, which in its proportion is less of a manufacturing town than Bradford. But while Bradford needs more than 12 million gallons per day according to this moderate estimate, it only gets a little more than 10 million gallons, or less than 25 gallons per head for all purposes. In years which at all approach to dryness, the supply has been so much restricted as to cause serious inconvenience; and this has occurred in portions of nine years out of the last fourteen. Since 1854, the water-works have been extended at different periods; but it is officially acknowledged that the benefit of the water so gained has in each instance been exhausted almost as soon as the works were finished, so rapid has been the growth of the town. Hence a bolder scheme is now proposed, intended to meet the present want and to keep pace with the growing demand. It is calculated that the Nidd scheme would hold good for the next thirty-three years, whereas the Grimwith scheme would prove inadequate at the end of nineteen years. It is also a drawback to the Grimwith plan that it is burdened with inevitable claims for compensation by mineral owners and others, for which no allowance has been made in the estimate. The Nidd project has the advantage of a drainage area containing no lead or other minerals to contaminate the water, or likely to serve as the basis of compensation claims. Dr. C. Meymott Tidy, having analyzed the water of the existing Grimwith compensation reservoir, declares it to be absolutely unfit, whether regarded chemically or medically, for the supply of the town. But some of the waters feeding the reservoir are spoken of approvingly. Animal pollution is absent both from the Nidd and the Grimwith water, but the latter possesses a high lead-dissolving power. Comparing the proposed supplies in every possible way, Dr. Tidy considers the results to be "enormously in favour of the Nidd Valley "water." But he observes that his report is limited to a consideration of these two schemes. "Whether these may "be the best or the only schemes for the supply of Bradford "with water," he expresses no opinion. Of the two projects it is tolerably evident which ought to be preferred; and it is certain that an extension of the existing works is urgently needed, for which purpose the sanction of Parliament will have to be sought. As the Corporation cannot afford to lose another year, it is to be hoped that the Nidd scheme is as good as it appears, and will be agreed upon without delay.

The will of the late Mr. J. F. La Trobe Bateman, F.R.S., F.R.G.S., a Past-President of the Institution of Civil Engineers has lately been proved; the value of the personalty being stated at £43,228.

Subject to audit, the Directors of the East London Water Company intend to recommend to the proprietors at their next general meeting to be held in October, the payment of a dividend upon the ordinary stock at the rate of 7½ per cent. per annum (less income tax), carrying forward £15,176.

Essays, Commentaries, and Reviews.

GAS AND WATER COMPANIES IN THE STOCK MARKET.

(For Stock and Share List, see p. 373.)

During the past week business on the Stock Exchange has been very fair, considering the time of year; and the markets have been pretty well supported. There has been no special feature of any note. The same may be said of the Gas Department. Transactions have been decidedly limited. Several changes have taken place in the quotations of the stocks, and these are to a large extent attributable to *ex div.* adjustments; but all, without exception, are in the upward direction. Gaslight "A" was very quiet at first, changing hands at 268 to 268½; but there was more activity shown in the corresponding figures with the dividend off. All the debenture stocks were in some demand at good figures; but the old quotations stood still. The preferences were not touched; but most of them are fractionally higher. In South Metropolitans, there were transactions in "B," at about middle price; but nothing moved. Commercials were quiet and steady. Among Suburbans and Provincials, Brentford old shows an advance of 2, and changed hands at 229 *ex div.* In Foreigners, there was some demand for Imperial Continental early in the week, at enhanced prices (and the quotation rose 2), after which the stock remained absolutely passive. San Paulo has made an advance of 1, consequent upon the resolution of the Company to increase their capital, upon highly favourable terms of issue, to the existing shareholders. Bombay has recovered strength to some extent; and Cagliari is higher. Other undertakings present no noteworthy features. The Water Companies have resumed activity after their torpor of the previous week, and show still increasing firmness. The principal advance has been effected by New River—viz., a rise of 8—notwithstanding that the dividend is slightly lower than it has been for some years past, being £5 19s. 4½d. per share, as against £6 1s. 3d. in previous half years. The other improvements in quotation have been made by Chelsea, East London, and Lambeth.

The daily operations were: Business in Gas was limited on Monday; but prices were good, though nothing moved. In Water, one transaction in Kent was all. Gas was even quieter on Tuesday; South Metropolitan "B" alone showing any activity. Quotations remained undisturbed. Business in Water marked a continuing demand for debenture issues. On Wednesday, there was more done in Gas, especially in Gaslight issues. Imperial Continental advanced 2; San Paulo, ½; and the *ex div.* variations noted above were effected. Water was quiet, but East London rose 2; and Lambeth, 1. Thursday's transactions in Gas were limited and featureless. Water was pretty brisk, and rose freely. New River advanced 7; and Chelsea and Lambeth, 1 each. Gas continued extremely quiet on Friday, and quotations did not move. Water was moderately dealt in; and the old prices were well maintained. On Saturday, the only feature in Gas was a "special" mark in Gaslight "A," at 260. San Paulo rose ½ more. Water was very quiet and unchanged.

ELECTRIC LIGHTING MEMORANDA.

THE MANCHESTER CORPORATION ON ELECTRIC LIGHTING—ELECTRIC LIGHTING BY CORPORATION GAS COMMITTEES—DR. LODGE ON THE NATURE OF ELECTRICITY—ELECTRIC LIGHTING AT ST. AUSTELL—PASSAGE OF THE ELECTRIC LIGHTING ORDERS CONFIRMATION BILLS THROUGH THE HOUSE OF LORDS.

The Manchester City Council, upon the instigation of Mr. Alderman Lamb, Chairman of the Gas Committee, have passed a resolution in favour of making an application for a Provisional Order for applying electric lighting in their district. From the discussion which preceded the adoption of this motion, it may be deduced that the impulse in this direction is precisely that which, as we have already pointed out, it is the cue of electricians to provide—the fear lest some intrusive joint-stock company would apply for an Order if the local authority did not. The Manchester Edison-Swan Company talked very big at their last meeting of going for a comprehensive Order, although they are financially very lame, and the Directors would infinitely prefer selling lamps to the Corporation. It may be supposed, however, that the Corporation do not fear this particular Company so much as another which may be at any moment launched in their midst. The local Edison-Swan Company is not the last expression of the electric light interest in the Manchester district; and the Corporation desire to forestall any new combination of the kind. If the Corporation obtain an Order, they will have to act upon it; and then the trouble will begin. It is probable that they will commence operations in a small way, if possible, with a view to limit their risk; and it will be upon all-fours with their previous policy to increase the price of gas for the purpose of piling up a fund to make good deficiencies in the electric lighting undertaking.

Salford is preparing to follow suit with Manchester; and from all that can be seen, it would appear that next season will be a busy one for the class of electrical advisers of corporations. Where corporations own gas-works, it is the gas committees that are entrusted with the control of the new departure; and consequently it will be for them to show whether gas-works organization is fitted in this country, as in the United States, to embrace the two systems of lighting. Matters in this respect are certainly taking an interesting turn; and it becomes more than ever necessary for gas engineers to keep abreast of the movement in electric light engineering.

Dr. Oliver J. Lodge has published a book, which is well recommended by competent specialists, giving the modern views of the nature of electricity. He has a good deal to say upon the general subject, and it is not his fault if his reader retains the impression that electricity is like an unsolvable x in mathematics, with which a calculator can work out many practical problems although he cannot state its equivalent. For want of this power of interpretation, men are still obliged to go on talking of electrical "currents," the electric "fluid," and so forth, while knowing all the time that these are pure conventions, the use of which is only a concession to the need of the human mind for something material to fix its ideas upon. A most interesting portion of Dr. Lodge's work is that in which he discusses the probable identity of electric vibration and light. The speed with which an electro-magnetic vibration is communicated along a wire has been found to correspond very closely with the velocity of light; and Dr. Lodge suggests that if electrical oscillations could be produced mechanically, it would follow that light could also be manufactured directly and economically. This is not the first time that Dr. Lodge has drawn attention to this subject; but it is full of difficulty, and perhaps all the more fascinating on this account.

It is reported that the little electric lighting experiment that has been conducted by Mr. Veale at the small Cornish market town of St. Austell for the last two or three years, has been very satisfactory to all parties. The service has been better and more regular than in many more pretentious undertakings of the kind, and the subscribers are pleased with the light, which is supplied either on the basis of equality with the previous year's gas bills, or at a charge of 17s. per annum for an incandescent lamp. The venture being a private speculation, no working accounts are published to show how it pays the contractor; but it is not believed to be directly profitable. As the contractor carries on a general business in erecting and maintaining electrical plant for factories, &c., it is considered probable that his town lighting speculation pays him as an advertisement. There has been no attempt to use electric meters in the town—the instruments being too costly, to say nothing of their uncertainty; for which reasons they are unsuitable for the small subscribers with whom Mr. Veale exclusively does business. There are no large factories in the town, which is wired underground; the compactness of the district greatly favouring this system. The street lamps are not lighted by electricity, but by gas as before.

The Metropolitan Electric Lighting Bills have passed the Lords' Committee; the great opposition that was threatened having proved milder than the promoters feared. No substantial alterations were made in any of the Orders; but some expert evidence was taken which seemed to convince the Committee that the programme before them was right and reasonable. Considerable credit attaches to Major Marindin for his treatment of these projects, which has not been impugned by anything done in either House of Parliament. It is not often that Board of Trade officials receive any acknowledgment of the value of their work for the public interest; and we are not aware that they look for it. Fortunately there are yet a few public departments not administered out of regard for newspaper opinions of the order that we get so much of at the present day; and the Railway Department of the Board of Trade is one of these. There is nothing sensational about the work of Mr. Calcraft and his technical advisers, or they would scarcely be left so much to themselves and their own interpretation of their duty. We cannot permit the opportunity to pass, however, without stating that if the projected electric lighting of London turns out a success, a great deal of this success will be due to the patience and wisdom with which the legislative part of the scheme has been elaborated.

Visit of Mr. G. C. Trewby to America.—In accordance with instructions received from the Court of Directors of The Gaslight and Coke Company, Mr. G. C. Trewby, the Chief Engineer, left England last Saturday week for America, for the purpose of investigating the various systems of water-gas manufacture now in operation in that country, and inquiring generally into the progress of electric lighting.

Projected Trial of M. Coze's System of Inclined Retorts at Brentford.—We learn that Mr. F. Morris, M. Inst. C.E., the Engineer and Manager of the Brentford Gas Company, has recently visited France for the purpose of inspecting M. Coze's system of inclined retort-settings, as carried out by him at the Rheims Gas-Works. Mr. Morris was so favourably impressed with the arrangement, that he is about to erect a trial setting at the Brentford Gas-Works. M. Coze's system was described and illustrated in the Journal, Vol. XLVI., p. 198; and Vol. XLVII., p. 25; and further described in Vol. XLVIII., p. 189.

The Managership of the Heywood Gas-Works.—At the monthly meeting of the Gas Committee of the Heywood Corporation last Wednesday, to which all the members of the Council were invited, the appointment of Mr. Walter Whatmough, chief collector in the rates department, to the position of Manager of the gas-works, from which Mr. Henry Hawkins has recently retired, was confirmed by a large majority. Mr. Whatmough was some years ago with Mr. Diggle in the Water-Works Department; and during this time he acquired considerable experience in main laying. This was considered an important fact in Mr. Whatmough's favour, which was not stated at the previous Council meeting. It is understood that, under a private arrangement, Mr. Whatmough will have the benefit of the advice of Mr. Hawkins.

THE CUPOLA FORM OF GAS-PRODUCING APPARATUS.

The illustrated description of the Loomis gas process recently given in these columns (*ante*, p. 252) will in all probability direct the attention of many gas engineers who have hitherto taken it for granted that the cupola form of gas generator was only capable of being worked for the production of non-luminous gas, to the versatility of this form of apparatus. It has been tacitly understood in English gas circles, that the cupola or generator furnace would serve as a means of evolving either producer gas, water gas, or a mixture of the two in any desired proportion, accordingly as air, steam, or a mixture of air and steam was admitted to the carbonaceous matter; but that for the production of illuminating gas from coal, the closed retort (heated externally) was the only available form of apparatus. The carbonic oxide difficulty has been accepted as a practically insuperable objection to the use of that form of apparatus which for the sake of distinction may be called the cupola, or open generator, in English gas-works, as a direct means of assisting in the production of the article supplied to the consumers; although its use in various forms of so-called generator furnaces, as a means of producing gaseous fuel for heating the retorts is well understood. The idea of closing the air and steam inlets to the generator, introducing a charge of bituminous coal, then subjecting the apparatus to the action of an exhauster, and drawing off a charge of coal gas pure and simple, will therefore be novel to most of our readers.

When the production of illuminating gas, containing not more carbonic oxide than that usually present in coal gas as ordinarily supplied, is actually proved to be practicable, the outside position to which the cupola has hitherto been regelated by common consent in England is radically altered, and it becomes a useful appliance for the retort-house. So far as it is possible to judge, there is no reason why a charge of ordinary gas coal, tipped into the Loomis generator, should not yield its full complement of gas, as compared with that obtained from it in an ordinary retort. On this point, however, it is desirable to await the results of actual trial on a practical scale. Assuming for the moment that the evidence is satisfactory, we first get the full complement of gas from the coal, and then proceed, without further labour in the way of "drawing" the coke and putting it into the furnace, to utilize it for the production of fuel gas. The modern plan of fitting a shoot to the mouth of the generator, drawing a charge of coke from a retort, and allowing it to fall directly into the place where it is to be gasified for fuel, is a great advance on the previous method of drawing the coke out on the ground, extinguishing it, throwing it into a heap, and using as required. But a process by which it is gasified for fuel in the same vessel as that in which it is treated for destructive distillation is a further advance. It would appear that the coal could be introduced into a generator at less expense than that involved in charging it into a retort; but setting this consideration on one side, it is evident that there is a saving equivalent to the labour of moving the exhausted charge from the retort into the generator furnace, and also of any loss of heat that may occur during the process.

These considerations naturally suggest the feasibility of introducing the water gas cupola as a part of the ordinary gas-works plant, and as a substitute for the ordinary furnace. A number of sets of such apparatus might be provided, in proportion to the number of mouthpieces worked, and a sufficient number kept in going order to supply the fuel gas required for the furnaces. Not less than two, or perhaps three, cupolas should always be at work, so as to ensure a regular and constant supply of furnace gas. This would be a move in the direction taken by Mr. C. C. Carpenter, who adopts one generator to the supply of four or five beds of retorts. The method of working would be to charge each cupola in regular rotation, with a suitable kind of gas coal. The ordinary make of gas being first extracted from it, the apparatus is then used to produce fuel gas, which may, by regulating the supply of air or steam, consist of a mixture of producer gas and water gas, the quality of which is only limited by the fact, that when producing fuel gas, the apparatus must be gaining heat, and not losing it. When making pure producer gas—that is when air only is being blown in—the production of carbonic oxide is attended with generation of heat, and the material rises in temperature; but as soon as steam is introduced the condition of things is reversed. The steam, instead off giving off heat, absorbs the quantity necessary for its decomposition, and therefore the supply of steam must be limited to a degree sufficient to prevent undue reduction of temperature, or else it must be intermittent, allowing of intervals during which air only is used for the purpose of getting up the temperature.

Applied in this manner, the apparatus acts alternately as a retort and as a furnace. There is no reason why, if found preferable, the principle should not be adapted to the construction of retort furnaces. But apart from its advantages as a means of supplying fuel for heating the retorts, there is also the important consideration as to whether coal carbonized in the Loomis generator is not made to yield its volatile products with greater economy than would be possible when it is carbonized in closed retorts in the ordinary way. It has been repeatedly observed that the actual temperature of carbonization is much lower than that prevailing on the outside of the retort, or indeed that of the interior when the retort is empty. The observations of Mr. Foulis may be quoted in proof. Fire-clay, though a suitable material for the construction of gas-retorts in some respects, is deficient in others—notably as a conductor of heat. The charge of coal, introduced at atmospheric temperature, cannot receive heat any faster than the same will pass through the walls of the retort to it. And we know that although a considerable excess of temperature, or excess of heat supply, which is rather a different thing, may prevail on the exterior of the retort, the rise in the temperature of the charge itself is comparatively slow, and a large proportion of the total make of gas passes off at a temperature lower than that desirable in the interests of economical carbonization. Hence the great advantage found to be obtainable by the working of short-period charges at high heats. Taking the average throughout the period of working, the gas is produced at a higher temperature, and passes away from the retort with greater rapidity, with the result that both the quantity and quality of gas are increased. Similar advantage may be expected to obtain in the Loomis generator, which acts as retort and furnace in one vessel. The coal, if introduced in proper proportion to the quantity of incandescent coke contained in the chamber, will reach the proper carbonizing temperature more rapidly than is possible in the closed retort. This method of working also presents the advantage that the last part of the charge can be diverted and used as fuel gas, if desired, after the plan proposed by the late Sir W. Siemens. The quality of the illuminating product would thus be improved.

The Loomis generator appears to be of greater diameter in proportion to its height than most of the forms of apparatus previously used. Thus one of the objectio is that might arise from the use of bituminous coal—that due to the swelling or caking of the material during carbonization—is obviated. It will be remembered that in 1874 Mr. Andrew Scott, of Musselburgh, described a system of carbonizing before the West of Scotland Association of Gas Managers,* which included the use of vertical retorts large enough to contain 12 cwt. of coal, conical in form, and tapering from bottom to top. This apparatus was not merely an idea put down on paper, but was actually in use, though it does not appear to have been largely adopted. It was possibly suggested by the apparatus used in Scotland for the distillation of shale. The coal was introduced at the top, and the gas outlet was situated at something less than half way up the side, from the bottom, which was open and sealed in water, into which the coke was received. Some difficulty arose in this form of retort, it appears, on account of the caking of bituminous coal, although it answered excellently for non-caking and cannel coals. The same difficulty existed as to the use of slack from bituminous coals in generators of the cupola form, and Mr. Loomis has devised special means of overcoming it—the chief feature of which is that, instead of working the apparatus under pressure, which has hitherto been the usual plan, he works it under exhaust. Under these conditions it is possible to open the generator and insert rods for stirring or breaking up the material, without interfering with its operations.

There is a further lesson for gas engineers in this apparatus. It does not, as is the case with almost all other generators, require the use of a separate boiler for the production of steam. Not only is the heat of the producer gas turned to account for the raising of the necessary supply of steam for the generator, but it also supplies the engine that works the exhauster. Possibly this engine would also be capable of actuating the scrubber pumps. Yet it is the invariable rule in gas-works—notwithstanding the fact that there are quantities of heat larger than that represented by the hot producer gases, continually escaping and going to waste by way of the retort-house chimneys—to have a separate boiler and furnace for generating the steam required for driving the exhauster and pumps. If the boiler C as attached to the Loomis generator (see *ante*, p. 252) is capable of supplying steam for the exhauster, and also for the generator, why should not an apparatus of a similar kind, fixed in the main flue from the retort-house furnaces, be equal to the supply of the steam required for the exhauster, scrubber-pumps, tar-pumps, &c., on an ordinary gas-works?

Another aspect of the question is the possibility afforded by the cupola system of economizing in respect to wages. This at the present time acquires considerable importance, when the London Gas Companies have just consented to an arrangement that will increase the amount payable for retort-house wages to the extent of nearly 20 per cent.; and the partial success which has attended the movements of the London gas stokers is attracting the attention of gas-works *employés* in all our large towns. The public are practically insatiable in their demand for cheap gas. There is the prospect of dearer coal, and more active competition from electricity. Times are therefore ripe for the introduction of any system of working that promises a saving in respect to working expenses. One of the chief objects in view by the introducers of vertical retorts, is the possibility of working them entirely by machinery. So far as can be judged, the Loomis generator presents no difficulties in this respect, and the labour necessary for working it would certainly be much less than that of treating a similar weight of coal in ordinary retorts.

Having put forward these suggestive remarks, we await with interest the practical trials which, as already stated, are about to be made with the system in England. While its applicability as an agent for producing fuel gas from coal slack and other kinds of cheap carbonaceous materials possesses much importance, the chief object from our point of view, is the capabilities of the apparatus for the production of *bonâ fide* coal gas, suited to the requirements of the British public, with whom any mixture containing anything like a large proportion of carbonic oxide is not

* See JOURNAL, Vol. XXIV., p. 93; also "King's Treatise on Coal Gas," Vol. I., p. 235.

likely to be acceptable. There is no evading the expert evidence as to the violently poisonous nature of carbonic oxide, and that it is far more deleterious than any other compound that is found in quantity in coal gas. The argument that a gas containing 30 per cent. or more of carbonic oxide is practically not more poisonous than ordinary English coal gas, which usually is free from anything beyond 4 or 5 per cent. of this substance, is therefore absurd. A gas containing such a large quantity of carbonic oxide must also possess considerably higher specific gravity than ordinary coal gas, seeing that carbonic oxide is nearly as heavy as air. Consumers supply pipes, as a rule, are already none too large, so the introduction of a gas similar to the carburetted water gas supplied in some parts of America would necessitate either a substantial enlargement of distributing pipes, or a considerable increase in supply pressure. The objection against either of these contingencies are too obvious to need enlarging upon.

THE CITY SURVEYORSHIP OF CARLISLE.—The Corporation of Carlisle have appointed Mr. Howard Smith, Assoc. M. Inst. C.E. (who has for three years held the position of Chief Assistant to the Borough and Water-Works Engineer of Leeds, Mr. T. Hewson, M. Inst. C.E.), Surveyor of that city, at a salary of £350 a year, with the privilege of taking pupils. There were about 70 candidates for the position. Before being appointed assistant to the Leeds Borough Engineer, Mr. Smith was Resident Engineer to the Great Northern Railway during the construction of several sections of that Company's system in Yorkshire, and has had varied engineering experience.

AMERICAN GASLIGHT ASSOCIATION.—The Secretary of the American Gaslight Association (Mr. C. J. R. Humphreys) has issued to the members the preliminary notice respecting the seventeenth annual meeting of the Association, which is to be held in the Concert Hall of the Concordia Building, Baltimore, on the 16th, 17th, and 18th of October next. He states that the details of the programme have not as yet been entirely determined; but the following papers will be read:—"Fuel Gas," by Mr. Walton Clark; "Gas Coals of the United States," by Mr. H. C. Adams; "Care and Operation of Gasholders," by Mr. C. L. Rowland; "Water Gas," by Mr. F. H. Shelton; "Leakage and Condensation," by Mr. E. C. Jones; "Purification of Gas from Kansas Coals," by Mr. B. E. Chollar; "Conduct of the Electric Light Business in Connection with the Gas Industry," by Mr. W. H. Pearson; "Advantages of Supplying a Mixture of Coal and Water Gas," by Mr. T G. Lansden; "Some Thoughts on Fuel Gas, induced from Practical Experience in the Distribution of Natural Gas," by Mr. John Young. There is in this list ample material for some good discussions. On the second day of the meeting, the members will be entertained at dinner; and the last day will, as usual, be devoted to sight-seeing.

ADOPTION OF THE EIGHT-HOUR SYSTEM AT THE SWANSEA GAS-WORKS.—In the JOURNAL a fortnight ago we stated, on the authority of a local paper, that the stokers at the Swansea Gas-Works had applied for the adoption of the eight-hour system, and the Directors not seeing their way at once to concede it, had given 14 days' notice. We are pleased to learn that a satisfactory settlement has since been arrived at. The Engineer and Secretary (Mr. Thornton Andrews) met the men in the most friendly way; and agreed to divide the day into three shifts. Under the old arrangement, the stokers charged and drew 72 mouthpieces (2 cwt. per mouthpiece) per gang of four men in twelve hours; attending also to the furnaces and coke and coal wheeling. Now each four-handed gang will have 68 mouthpieces per eight hours, with the other work mentioned, at the same wages. The new arrangement came into force last Thursday. The men have not failed to show their appreciation of this great concession, and have offered to do more work per man than they have hitherto performed. Although this is very satisfactory, it is not the most pleasing part of the business; for Mr. Andrews, gratified at the courteous way in which the men's negotiations were conducted, has made each of them a present. The best feeling prevailed throughout; and the Directors have expressed their concurrence in the arrangements arrived at.

MR. ELLIS LEVER AND THE MANCHESTER GAS COMMITTEE.—It is reported that Alderman Sir John J. Harwood, Alderman Edmund Asquith, and Messrs. J. Hinchcliffe, R. Gibson, G. Clay, S. Chesters-Thompson, J. Brooks, and H. C. Pingstone, members of the Gas Committee of the Manchester Corporation, have each individually instituted criminal proceedings for libel against Mr. Ellis Lever, arising out of the letter dated June 7, 1889, and addressed to the Mayor of Manchester by Mr. Lever (*ante*, p. 87). Publicity has been given by the *Manchester Examiner* to the following telegram, which was forwarded to our contemporary by Mr. Ellis Lever:—"At the last Council meeting, Mr. Chesters-Thompson is reported to have stated that I had made charges at Halifax, and then bolted; that I had made similar charges at Leeds, and then run away. If Mr. Thompson will prove this to be true within one week, I will contribute £1000 to the Manchester Infirmary, on the condition that Mr. Chesters-Thompson undertakes to contribute the same sum in the event of his failing. The *Manchester Courier*, in a leading article on the 8th inst., made certain statements in regard to my action at Halifax. If the *Courier* will prove the truth of these allegations, which are so hurtful to me, within one week, I will contribute a second £1000 to the Manchester Royal Infirmary, without asking the *Courier* to undertake to pay anything."

Communicated Article.

THE CHEMISTRY OF ILLUMINATING GAS.

By NORTON H. HUMPHRYS, Assoc. M. Inst. C.E., F.C.S.

XXVI.

In preparing his second paper, Mr. Pearson had the advantage of an additional twelvemonths' experience with the Lowe process; and he commenced by saying that, taken as a whole, he was still as well satisfied as to its superiority over the ordinary methods of working, as he was last year. For about five months he had been using the Lowe process exclusively. During that time he made 70 million cubic feet of gas from 14,865 charges, giving an average production per charge of 4690 cubic feet, which is a great advance on the previous results. The consumption of oil was 4·29 gallons per 1000 cubic feet of gas made; of anthracite in the generator, 59 lbs.; and of coal under the boilers, 11 lbs. The average quantity of gas purified per bushel of lime was 9700 cubic feet; and the cost of purification, including labour, was 1·8d. per 1000 cubic feet. The cost of the generator and the boiler-house labour, including the salary of the superintendent, was 3·8d. per 1000 cubic feet. He had now six sets of apparatus; and the largest daily production obtained from them was 681,000 cubic feet, four stokers being sufficient to work this quantity of gas. He had given the subject of unaccounted-for gas a great deal of attention, and proved by experiment that the gas did not lose by storeage. A table was appended, showing that whereas the loss by leakage, &c., ranged from 15·5 to 19·75 per cent. when the coal gas was supplied, it was reduced from 8 to 13 per cent. when all Lowe gas was being sent out. Certain alterations had been made in the mains, &c., which would account for some of the reduction in leakage; but the workmen had found very much less condensation in the drips since the Lowe gas was passed through them, and therefore Mr. Pearson concluded that it was to be credited with the greater portion of the reduction. This is certainly a remarkable claim—that the Lowe gas was the means of reducing the leakage to a considerable extent, particularly as an increase of one-eighth in the supply pressure was found necessary, on account of its greater specific gravity. Several other details of working, cost of apparatus, &c., are discussed in the paper.

For another practical paper on the same subject, the reader may be referred to that read by Mr. G. A. Burns, at the 1883 meeting of the Western (U.S.A.) Gas Association, and entitled "The Lowe Water-Gas Process at Pullman."* It comprises some account of the results obtained during 16 months working with this process exclusively. The works were established and gas making commenced in 1881, beginning with one set of apparatus, which consisted of a generator 4 ft. 2 in. in diameter by 10 feet high, a superheater of similar diameter but 14 feet high, a washer 5 feet diameter by 2 ft. 6 in. deep, two scrubbers each 30 inches diameter by 10 feet high, purifiers 8 feet in diameter, a station meter, and 8-inch connections throughout. With this apparatus, 65,000 cubic feet of gas per diem was actually produced, and a greater quantity could have been made if required. During the eight months of 1881, about 3¼ million cubic feet of gas were made, of which about 3 million was accounted for. Besides the *bonâ fide* loss by leakage, a considerable quantity of gas was used to blow air out of the new mains; hence the very high proportion unaccounted for—about 7 per cent. In 1882 the development of the business rendered it necessary to extend the plant; and accordingly a larger generator, 6 feet diameter by 10 feet high, with superheater 5 feet diameter by 16 feet high, was added, together with engine, boiler, and other accessories. Full particulars of the consumption of materials during 1882 are given, from which it appears that 48·2 lbs. of anthracite, 45·3 lbs. of Illinois coal, 1·66 lbs. of coke, 4·63 gallons of naphtha, and 1-18th of a bushel of lime was about the average consumption for each 1000 cubic feet of gas produced. The Illinois coal was used under the boiler; and the large consumption of it is explained by the fact that the steam was not used exclusively for gas making, but also for heating the works and gas fitting department, keeping the holder tank free from ice in winter, &c. It is claimed that nearly the whole of the gas sent out during 1882 was accounted for, the leakage being practically less than 1 per cent. During the first four months of 1883, the average consumption of materials per 1000 cubic feet of gas made was 46·49 lbs. of anthracite, 53·87 lbs. of Illinois coal, 0·42 lb. of coke, 4·45 gallons of naphtha, and 1-25th of a bushel of lime. During this period the quantity of unaccounted-for gas was actually *minus*; there being a slight gain. This is explained by the fact that the station meter was too small to register the quantity of gas passed through it. In view of this explanation, the figures given for the preceding year must also be regarded as unreliable. The quantity of gas made was probably more than that stated in the paper; and therefore the average consumption of materials per 1000 cubic feet of gas made, as above stated, would be too high.

The average production per run (or charge) was 3000 cubic feet with the small apparatus, and 4500 feet with the large. But gas was produced very rapidly at first—1000 cubic feet being evolved in as short a time as 3 minutes; so it was expected that, with a larger station meter, a considerably increased production per run would be registered. With the large apparatus as much as 10,000 cubic feet had been produced by blowing up for 45 minutes and running for one hour, and 8000 cubic feet in a 40-minute run. With the small apparatus, 6200 cubic feet had been made in an hour's run.

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* See JOURNAL, Vol. XLII., p. 329

But in steady working, a run was made every 80 minutes; the same being stopped as soon as the average production above named was secured. The illuminating power of the gas was about 20 candles. Mr. Burns contended that the Lowe gas could be made much more cheaply than coal gas. Being questioned closely on this point in the course of the subsequent discussion, he declined to make the exact figures public, but was willing to show them to any member privately.

These papers give a great deal of information of a general character, from which any gas engineer can form his own opinion as to financial results; but there is a certain reticence upon some points. It is admitted that greater care in working is necessary than with the ordinary process; and even with every care, it can scarcely be proved that the water gas can be maintained as regular in quality as coal gas. Several important details must be carefully attended to, in order to ensure successful working, such as the raising of the generator and superheater to the proper condition of temperature for the production of gas, the changing of the valves at the right time, the adjustment of the supply of steam and oil, &c. Where only one or two sets of apparatus are in use, there are the difficulties consequent on a very erratic production of gas. No indication is given as to the means adopted for ascertaining the proper period for closing a "run," beyond the fact that it is usual to stop when a certain quantity has been made. But a more reliable test—such, for instance, as that afforded by a jet photometer—would seem to be needed. The small quantity of lime used (0·1 to 0·04 of a bushel per thousand cubic feet of gas made) seems to show that the carbonic acid purification was not complete. In the discussion on the papers above mentioned, it is noticeable that the alleged cheapness or superiority of water gas as compared with coal gas is always vigorously questioned.

In 1878, a series of articles consisting of a review of the history and progress of water gas manufacture appeared in the JOURNAL.* After claiming that Mr. Kirkham in England was the originator of the "generator" used instead of retorts for the manufacture of water gas, the writer shows that the presence of carbonic oxide to the extent of one-third or more in the gas is generally admitted, and quotes the evidence of M. Dumas before a Commission in Paris in 1854, and others, as to the extremely poisonous nature of carbonic oxide. This had led to the abandonment of Kirkham's and other systems in France. A brief notice of Donovan's and of Manly's specifications prefaces an illustrated and detailed description of the apparatus patented by Val Marino in 1839, which comprised settings of three vertical retorts. All three are filled with coke or charcoal, and water or steam is admitted into one of them, whilst another is supplied with hydro-carbonaceous matter such as fat, oil, or tar. The gases produced by the decomposition of the steam in the first retort are caused to pass through the second, and then meet the hydro-carbonaceous matter at the top of the third retort, passing with it through the column of coke, and at last escaping to the collecting main at the bottom.

Attention is next directed to the patent taken out by Messrs. J. and T. N. Kirkham—No. 14,238 of 1852—which was further elaborated in another specification deposited two years later. Several features of modern water gas plant will be recognized in the illustration. There are a pair of upright cylindrical generators; a system of air-pipes for injecting air to secure the raising of the coke to full incandescence; and a superheater or mixing chamber. In addition, large tubular regenerators are provided, whereby the air supply for each furnace is heated by means of the products of combustion, and thus supplied to the generator at a high temperature. The steam is supplied at the top, and caused to pass downwards through the incandescent coke. The gases thus produced pass through an exit at the base, direct to the mixing chamber, which is heated by a separate furnace. Immediately at the entrance they encounter a supply of rich coal gas, and are mixed with it by passing up through the contents of the superheater. From the top they are conducted off to suitable purifying apparatus. The object of providing the generators in duplicate will be obvious from the description of water gas apparatus already given.

A jump of 25 years carries the reader to the operations of the Municipal Gas Company of New York, which was established in 1875 for the purpose of manufacturing water gas upon systems devised by various inventors, all working upon the principles indicated in Kirkham's patent. Mr. Rowland, of Brooklyn, having shown by experimental apparatus the possibility of manufacturing a 24-candle water gas, the Company agreed with him to erect works capable of producing 500,000 cubic feet per day. This undertaking was so far successful that within two years a second agreement with Mr. Rowland, stipulating for the erection of apparatus to make 3,000,000 cubic feet per day, was entered upon and carried out. A plan of the plant first named is given; and from this it appears that the apparatus comprised a series of boilers for generating steam, and regenerators or superheaters used both for steam and air. The crude gas from the generators, after passing through a condenser, is conveyed into a small gasholder. From this it is delivered as required to the carburetters, first passing through a set of ordinary purifiers. In the carburetters it passes over a number of trays containing naphtha, and is saturated with the vapours of it. It is next caused to pass through a number of retorts, similar to those used for coal distillation, so as to "fix" the vapours; and thence it goes through the condenser, washer, exhauster, and meter to the holder.

* See Vol. XXXI., pp. 831, 908, 943, 979; and Vol. XXXII., p. 87.

An apparatus patented by W. Hackness, of the United States, is next described. It comprises three upright cylindrical generators, and a setting of three horizontal retorts heated in the usual way. The gas from the generators, which may be either crude water gas, as is obtained by using coke or anthracite, or a mixture of water gas and coal gas, obtained by the use of bituminous coal, is caused to pass through the three retorts in succession. At the entrance to the first, it meets a stream of oil or other carbonaceous fluid, which is converted into gas, and "fixed" during the passage through the retorts. The inventor supposed that the gas from this apparatus would possess a specific gravity of ·700 and be entirely free from sulphur and other impurities, thus dispensing with the need for washers or purifiers. The Lowe process, as already noticed, is next discussed, together with improvements and modifications proposed in the same, such as a hopper and cone valve for replenishing the generator without admission of air, an air-heater or regenerator fixed on the top of the superheater, &c.

Returning to the Municipal Gas Company of New York, several details of the new and larger apparatus are described with the aid of illustrations. These include a special form of generator, divided into two compartments by a partition, in which are enclosed systems of tubes to serve as superheaters for steam or air, invented by M. Jerzmanowsky. The separate superheating apparatus used in the first apparatus is dispensed with. A special feature in working this and other forms of generators, is the maintaining the gases in them under pressure, so as to facilitate the contact of the gas with the carbonaceous matter. A slight change in the way of working the purifiers was also found advisable. Instead of purifying the uncarburetted gas, as at first practised, the gas was not passed into the purifiers until it had been carburetted and fixed. It was also found necessary to maintain the carburetters at a temperature of 160° to 180° Fahr.; and this was effected by surrounding them with a steam or water jacket. The fixing retorts were similar to ordinary beds of six through retorts. Ordinary hydraulics and ascension-pipes are provided at one end, and at the other there is a large delivering main with branches communicating with each retort. The retorts require to be maintained at a bright-orange heat, and are partly filled with loosely-packed firebrick, &c., to secure the thorough mixing of the gas. If the heat is too high, soot is formed and the gas is impoverished; if on the other hand it is too low, some of the naphtha is deposited.

IN noticing, in the last volume of the JOURNAL, the awards made at the Melbourne Exhibition, we mentioned that Messrs. W. and B. Cowan obtained for their exhibits the highest possible award—viz., a First Order of Merit, with special mention for excellence. We now learn that in addition to this Messrs. Cowan obtained a gold medal.

IT will be seen from our "Parliamentary Intelligence" to-day that the House of Lords has agreed to the recommendations of the Joint Committee of both Houses appointed to consider what restrictions should be placed upon companies desirous of altering their Memorandums of Association. The only important change proposed is that the debenture-holders shall be informed, after the second reading of a Bill, of the impending alterations, and time given them to organize an opposition if they think fit.

ON the occasion of the recent hygienic congress in Paris, the disposal of the sewage of the city, of course, occupied considerable attention. On the last day of the meeting, the members inspected the sewers; and subsequently visited the plains of Gennevilliers, where the sewage farm is situated. Here about one-third of the liquid sewage is dealt with. The rest of the sewage falls into the Seine at Asnières, where it kills the fish and befouls the water for a distance of about 80 miles. A recent law sanctions the utilization of land at Achères for sewage disposal purposes; and there another third of the liquid will be purified. If, as is anticipated, a similar concession is obtained at Méry, the whole of the sewage of Paris will be used for the purposes of market gardening, &c., and the Seine will no longer be contaminated. At the luncheon which took place at Gennevilliers, a toast to the memory of M. Durand Claye, the late Chief Engineer of Paris, and projector of the sewage scheme, was drunk with great enthusiasm; and a proposal to raise a monument in his memory was adopted.

WITH reference to the letter published in the last number of the JOURNAL, denying the statements contained in a paragraph in our issue for the 6th inst. as to the public lighting experiments at Bromley, our local correspondent, who supplied the paragraph in question, states that not only has he personally experienced the nuisance caused by the oil lighting, but those who reside in the neighbourhood where the experiment is going on will bear him out in his assertions. With regard to the communication to the Local Board, he forwards a copy of the *Bromley District Times* containing the following as part of a report of the proceedings of the Bromley Local Board on the 30th ult.:—"The Clerk said he had received a letter from Messrs. Defries and Co., stating that their attention had been called to a report that a serious nuisance was caused by several of their oil-lamps (lighted experimentally in the town for the Board by that Company) not being properly looked after; and they wished the Board's answer on this point, as the report was liable to do them injury. The Clerk was directed to write to Messrs. Defries that the Board had no knowledge of any complaints of the kind."

Technical Record.

NORTH OF IRELAND ASSOCIATION OF GAS MANAGERS.

The Annual Meeting of this Association was held last Tuesday, in the Market House, Dundalk. The PRESIDENT (Mr. W. B. Featherstone, of Dundalk) occupied the chair; and there was present a good muster of members and friends.

The PRESIDENT opened the proceedings by reading the following

INAUGURAL ADDRESS.

Gentlemen,—At this, our second annual meeting, I think we may congratulate ourselves upon the success of the North of Ireland Association of Gas Managers, which, though young in years, gives abundant proof of its possessing the elements of a successful and useful life. Personally I am proud of the position which I occupy to-day with your concurrence; and I cannot make a better acknowledgment of the honour you have done me than by furthering the interests of our Association to the best of my ability and at once proceeding with the work before me.

In the few remarks which I am now to address to you, I shall not attempt to deal with the higher branches of gas engineering, but shall devote myself to advancing a few reasons why gas-works vary so much in their power of extracting gas from a ton of coal—a subject which in these days of statistics is of considerable interest to most of us, and which may lead to a useful discussion.

In the first place, the treatment of the workmen has a considerable effect upon the results produced. My short experience goes to prove that liberal wages and reasonable hours produce intelligent workmen, who can, and do, give a good day's work in return. I believe it to be true that the best results are obtained where the workmen are best treated—the price of gas is highest where the wages are lowest, and lowest where the wages are highest. Then I would recommend that the pay should be, to some extent, proportionate to the interest manifested by the men in their work, and to the return received by the shareholders.

Assuming that we have got our skilled and intelligent stokers, our next care should be as to proper working accommodation for them. They should be put to work in a retort-house, large, lofty, well ventilated, and free from strong draughts, well paved, and so arranged that coal can be taken in, and coke discharged, without exposing the men, no matter from which direction the wind may blow.

With respect to the retort-bench it should be built independent of all walls, so as to be self-supporting and easily examined or repaired in case of settlements, cracks, &c. The bench will expand as it is heated up, and this will crush in the retorts, or bulged walls and distorted roofs will occur, which are no benefit to a bench. Cracked and exposed back and side walls are a great cause of failures to keep up good heats in retorts. I have heard of benches jammed in the end of a shed open at one end; and coal, which has crossed the sea, has been laid upon quays, and carted for miles in the rain, is often carried across an open yard on a stormy night, and given an hour to steam up before being placed in the retorts. This system of treating coal before putting it in the retorts carries its own condemnation.

Even though we commence with good heats and dry coal, stopped pipes come sometimes through small ascension-pipes or thin front walls. I find that a spray of water put down inside from the top cap, does much good, provided this is done from the first, when the pipes are clean. I used to advocate anti-dips; but, after trial with and without seal, I find that for convenience, safety, soundness, and regular working, clay retorts require half-an-inch, or even more, of a seal.

I would rather be without faced mouthpieces, and I will not have any more until some simple means of re-surfacing in action is introduced. The self-cleaning, sliding motion does not work in practice with me; and I would like to see the inventor, on a winter's night, with 6 inches of back pressure, make a sound joint with his self-cleaning, sliding motion on an old mouthpiece.

Hydraulic mains in sections are no doubt an advange; but the number of valves is an abjection, as they stick or give way altogether, and this, too, at a troublesome time.

With regard to condensation, in my opinion it is important to cool gas very slowly. Let the heavy tar run away, but lead the hot gas through a large wrought-iron foul main, placed round the interior of the retort-house and guarded from draughts, water, or sudden changes of temperature. Let the main down to the ground inside the retort-house, and let its continuation to the condenser be at least 2 feet underground. In placing condensers don't back them up against buildings or walls, but place them in the open yard. When placed against a wall, the effects due to variations of the weather are more pronounced—the intense heat of one day and the chilly blasts of the next are aided by the presence of the wall. It should be in the power of any man in charge to regulate the temperature of the condensers; but, by the way, where is the thermometer which will keep its mark clear and clean for twelve months under the conditions existing in gas-works? In many local works there is a pipe or battery condenser, without even a bye-pass; and the temperature of the gas varies in accordance with the weather—a state of things which ought not to exist.

Many gas-works have either none at all or but one gas-engine and exhauster. Now, this appears to me to be absurd, because we ought to push the sale of gas by example. In the works with which I am connected, we have had a gas-engine running day and night for ten years, and we would have another were it not that it is advantageous to have steam upon a gas-works. But gas should always be looked upon as the principal source of the motive power required in a gas-works. A gas-engine of 3½-horse power for less than 2d. an hour, without attendance and always ready for use, is a boon I should not like to part with.

When the gas has come to the scrubbing stage, I would say: "Wash and scrub the gas to your heart's content; but mind the temperature of the water is not below 60°." Bear in mind that until the gas is lighter than it is at this stage, sudden changes of temperature are dangerous to it; and do not expose a gas connection anywhere unless you have the power of controlling the temperature.

With regard to purifiers, the only advice I can give is, "Get them big enough." For myself, I prefer to work with foul lime, then oxide, and finally clean lime catch purifiers.

Storeage is an important matter, and a safe rule is to get as much holder room as possible. Where there is a large and a small holder, make the smaller holder the heavier, so that the outlets of the two holders can be left open without danger; also the small valve only partly open, so that in case the large holder is emptied the small one will prevent a collapse. I always leave the keys upon closed, and remove them from open, gasholder valves.

I do not agree with a very light street pressure during the working day; for I find that light pressures and large leakages run together. Of course, for a few hours after midnight, a pressure as low as possible is the best.

Hard-and-fast rules in connection with the charge for gas ought to have been long since buried. The price of gas should be reduced as low as local circumstances will allow; and the local gas-fitters should be encouraged in every possible way to push the consumption of gas. They should have special terms for gas apparatus, because they can buy oil wholesale, but not gas. The consumption of gas for motive power and heating should be encouraged in every possible way, for in this direction, I feel sure, there is a great future for our gas undertakings. That there is necessity for some push on the part of gas suppliers, is evidenced by the state of affairs in this town. The newest pattern of oil-lamps are in full blaze, but the new kinds of gas-lamps are tied up neatly and placed in a dark corner (not on the premises of the gas maker), patiently waiting their turn of life. It should be the gas maker's object to alter this state of affairs, and to put the gas-burner as much in evidence as the oil-lamp now is.

The electric light was here once, and gas—poor gas! was to burn slowly out and die. We had three representative columns in the streets; but two had no head, and the other would not act. The electric lamps were removed and some of the posts helped us to put in new retorts, acting as shear legs. The oil post put his head on again, but generally wears a black cap and appears ashamed of its light. Perhaps, gentlemen here will take a walk through the streets to-night; but if special precautions have not been taken, and if it happens to be a little windy, inspect the oil lighting, and you will find darkness can be made visible. I suppose we shall paint up our lamp-posts again and go on as usual some day; and if we do light the town again, it should be done so that people will come to see the town, and so that the shopkeepers might be induced to use more gas. A little enterprise in this direction on our part, would not, I think, be thrown away.

Quarterly accounts and the mysterious, silent, accurate meter to back them up are the cause of much bad feeling. How few of us would run a ninety days' account with a tradesman and take his word for the amount? We always say "there's the meter register;" but the mischief is done before the consumer knows that the gas has been on all night, and the rooms lighted when he was absent. He will not trust us any more. If we stick to quarterly accounts, monthly inspections should be made, and the consumption noted on a card given in charge of some person appointed. January could be checked with January, and so on; and often it would be proved that the greatest consumption is when the family are away, because there is fancied protection in well-lighted rooms.

Perhaps it is not generally known that an escape of gas can be located to the floor in which the escape is going on by a simple water gauge, fixed on the meter outlet. Turn on the gas at the main tap, and shut it off again. The pressure in the gauge will not only fall to zero, but the escaping gas will gradually cause a vacuum in the gauge in proportion to the height of the escape. A little experiment (turning the burners on or off) will prove this, and at the same you can gauge the glass for the height of the escape.

In concluding this short address, I may mention that every new setting upon the Dundalk Gas Works is constructed slightly different to its neighbour; and I hope to place some reliable data before you at some future time upon the results obtained by different furnaces, and the advantage of 4, 5, 6, and 7 retorts in a setting, such as I have to use.

Our young society should look ahead, and I hope some other members will endeavour to lay down a subject for special investigation, and report results; and so help to strengthen our Irish Society. Gas has a great future, if good seed is sown, and I certainly think directors should take a practical interest in these gatherings, and we will march on to better dividends and cheaper gas. The great heads of our firms look on and approve when we are successful (sometimes). Knowledge is power, but no man lives but has to learn from another; and such is our object—to learn from another. Echo may answer that it is generally the "another" who takes the cream. Combination for the exchange of ideas is a grand thing, and I hope we shall long combine.

COMMITTEE'S REPORT.

The HON. SECRETARY (Mr. J. Whimster, of Armagh) then read the annual report of the Committee, as follows:—

Your Committee, in presenting their second annual report, are glad to be able to congratulate the members on the continued vigour of the Association. The meeting held in Lisburn last year was highly successful and promising; and the Committee desire to express their thanks to the then President for his admirable address, and to those other gentlemen who so kindly came forward with papers at that meeting—papers which were both interesting and instructive, and which the Committee believe were highly creditable to a new Association.

As it will be rather difficult, from our limited membership, to procure a great number of papers for each meeting, your Committee have thought it advisable to introduce at the meetings some subject of special importance for free and general discussion For this year's meeting, in addition to the President's address and the three papers on the *agenda*, they have selected the subject of "Stopped Ascension-Pipes" as one of which all have had more or less experience; and they have every confidence that the members will freely engage in the discussion of this topic, and that such discussion will prove interesting and valuable.

The Committee are sorry to report the loss, during the year, by death, of one extra-ordinary member—Mr. R. Johnstone, of Edinburgh.

They are happy to say that a number of applications for membership have been received, and the names of 15 gentlemen will to-day be submitted for election. A good many timid enquiries regarding the Association are being made by brethren in different districts; and there seems to be no doubt that as our work gets better known, new members will be added year by year, until our Association will become fairly representative of the whole of Ireland.

The financial statement herewith presented shows a balance in hand of £3 15s. 3d.

According to Rules 25 and 26, three members of Committee retire now, and are ineligible for immediate re-election. The retiring members are Messrs. Nisbet, Waddell, and J. Mearns.

W. B. FEATHERSTONE, *President.*
JAS. WHIMSTER, *Hon. Secretary.*

The report was adopted.

SUGGESTED CHANGE OF THE TITLE OF THE ASSOCIATION.

The SECRETARY stated that he had received a number of letters from gentlemen residing in the South of Ireland on a subject of the very greatest importance. He was glad to say that the circular he had sent out calling the meeting on this occasion had brought replies from many gas managers in Ireland. He might mention that they had with them that day a gentleman from Athy, who had come at very great trouble and inconvenience; and there were a number of others who would have come long distances to attend the meeting, had not special circumstances prevented them. This, in his opinion, was a very satisfactory state of things. However, to return to the correspondence, he wished to say that he had a letter from Mr. Lyne, of Wexford, in which that gentleman found fault with the name of the Association. His objection to the title seemed to be that it was too narrow; and he expressed his willingness to join the Association if the name was changed to the "Irish Association of Gas Managers." He (the Secretary) wrote to Mr. Lyne, informing him why the Association took the title which it bore at present—namely, because the members do not think they could venture to speak on behalf of the whole of Ireland, seeing that most of them belonged to the north. They formed the Association for the north of Ireland; but they would extend a warm welcome to anyone, whether he resided in the north, south, east, or west. However, having regard to the objection which there was to the name, perhaps the proper course to take would be to communicate with all gas managers in Ireland, with the view of ascertaining how many would join the Association if it was given a title of a national and comprehensive character, so as to include the whole of Ireland. He thought it right to bring the matter under the attention of the Association, in order to ascertain their feeling on the subject, and to devise steps for increasing the membership, and thus extending its usefulness.

The PRESIDENT asked if there was any reason why they should change the name. He would like to hear the opinions of members on the subject.

Mr. D. WILLIAMSON (Ballibay) asked if circulars were not sent to every gas manager in Ireland.

The SECRETARY replied in the negative. He said he drew a line from Drogheda to Galway, and forwarded circulars to all living north of that line.

Mr. WILLIAMSON said he was under the impression that when the idea of starting the Association was mooted, circulars were sent to all gas managers, asking them to attend the meeting.

The SECRETARY said that was so.

The PRESIDENT remarked that circulars were sent to every gas manager whose name they could obtain; and he thought it would not do any harm to change the name, if it had the result of increasing the membership.

The SECRETARY observed that he had made his previous remarks as Secretary of the Association; and he now desired to say, as a private member, that he thought there were some objections to be adduced against the proposal to change the name of the Association. They all, with one or two exceptions, belonged to the north of Ireland; and it would be a piece of presumption on their parts to call themselves the Irish Association of Gas Managers. This would include Dublin, Limerick, and Galway—in fact, all Ireland; and he questioned if they had the right to speak on behalf of the whole of Ireland.

Mr. J. ROBB (Cinderford) said that the members commenced the Association in a small way; but it was gradually increasing in numbers and usefulness. He suggested that the Secretary should write to all the gas managers in Ireland, asking them if they would join, in the event of the proposed alteration of name being made. If the result was satisfactory, and if it appeared that the change would be for the benefit of the Association, then it could be made; but if there was not a sufficient response to the call, then there should be no change, because they would not represent all Ireland, and should not attempt to speak for it. He proposed a resolution to that effect.

Mr. R. MERRILEES (Castleblayney) seconded the proposition.

The PRESIDENT thought Mr. Robb's suggestion was the proper course to adopt. The circular could be sent out; and at the next meeting the members would have the results before them, and would be prepared to come to a decision upon the point. The matter would be put on the paper for discussion.

The SECRETARY said that the decision practically was that the subject was remitted to the Committee to consider and report upon.

The resolution was passed.

ELECTION OF NEW MEMBERS.

The SECRETARY next proposed that the following gentlemen be elected members of the Association—Ordinary members: Mr. C. Outon, of Inchicore; Mr. H. A. Smith, of Enniskillen; Mr. T. B. Travers, of Cork; Mr. C. B. Tully, of Sligo; Mr. J. Orr, of Monaghan; Mr. T. Reilly, of Strabane; Mr. J. B. Dickson, of Ballycastle; Mr. H. Hickey, of Magherafelt; Mr. J. Henry, of Aughnacloy; Mr. G. Cummings, of Ballymoney; Mr. R. Donnan, of Cootehill; and Mr. Martin, of Drogheda. Extraordinary members: Mr. J. Clark, of Edinburgh; and Mr. J. T. Hayes, of Liverpool.

Mr. A. GIBB (Newry) seconded the resolution, which was passed.

ELECTION OF OFFICE-BEARERS.

The election of office-bearers was then proceeded with.

The SECRETARY proposed that Mr. Andrew Gibb, of Newry, be elected President of the Association for the year.

Mr. R. Ross (Dungannon) seconded the resolution, which was passed unanimously.

Mr. GIBB, in returning thanks, said he was deeply sensible of the high honour that had been conferred upon him; and he hoped, when his year of office was at an end, to restore to them the trust which they had confided to him untarnished and unsullied. He could assure the members that he would do the very best he could to discharge the duties of his position faithfully and well. He again thanked them for the honour they had done him.

The SECRETARY proposed that Messrs. W. S. Stormonth (Coleraine), D. M'Cullum (Omagh), W. Mearns (Dromore), and E. Stears (Lisburn), be elected to fill the vacancies on the Committee.

Mr. T. FRIZELLE (Holywood) seconded the resolution, which was passed unanimously.

Mr. J. NISBETT (Portadown) proposed that Mr. Whimster be re-elected Secretary and Treasurer. He did not think they could make any change for the better in this respect.

Mr. STEARS seconded the resolution, and said he hoped that the Association would continue to flourish and increase under the fostering care of Mr. Whimster.

The PRESIDENT said there was no doubt that Mr. Whimster was the right man in the right place; and they should keep him there as long as they possibly could.

The resolution was passed unanimously.

Mr. WHIMSTER thanked the members for the hearty manner in which they had re-appointed him to the position of Secretary. He could assure the members that he was doing the very best he could; and he would continue to further and advance the interests of the Association to the best of his ability. He begged to propose that Mr. C. Todhunter, of Ballymena, be re-elected Auditor.

Mr. ROSS seconded the motion, which was carried unanimously.

Mr. W. S. STORMONTH (Coleraine) then read a paper entitled—

EXPERIENCE IN THE INTRODUCTION OF GAS-STOVES.

A paper on such an every-day matter in our business may not be of so much interest as one on some detail dealing with the manufacturing operations. However, to the writer, the commercial has quite as much attraction, if not more than the manufacturing department; hence my reason for choosing this subject. As brevity is usually considered a virtue, I will endeavour to gain your good opinion on that score if on no other.

On going to Coleraine some three-and-a-half years ago, I found that gas cooking and heating appliances were practically unknown there; only a single cooking-stove being fixed, and that for use at irregular intervals. This state of matters was attributable to several causes—the gas was not cheap enough, was not sufficiently pure, and no effort had been made to push the sale of stoves. Perhaps there would have been, had the circumstances been more favourable. Previous to removing these disadvantages, I endeavoured to induce some of the consumers to adopt gas for cooking and heating whenever I had an opportunity in the course of conversation. This method resulted in the introduction of only one stove, attended by a good deal of chaffing about the futility of trying to sell more of our dear and quite too odorous commodity.

At this time the works were being overhauled; and a large portion of the apparatus renewed—placing us in a position to supply gas in a very different condition to what we formerly had been able to do; and shortly afterwards the price was reduced by 10d. per 1000 cubic feet. This, of course, was acceptable to the consumers, and doubtless influenced them to look with more favour on the use of gas. Our alterations being completed, and having a vivid

recollection of my previous and unsuccessful attempt to introduce stoves, I now determined to try a different plan—viz., that of holding an exhibition of gas appliances, and adopting the system of hiring out cookers in the same way that we hire out meters. I was led to this decision by the experience of others, more or less successful; and I must here acknowledge my indebtedness specially to Mr. Stelfox, of Belfast, and Mr. Whimster, of Armagh, who were very kind in answering any inquiries I had to make.

An exhibition was held in the Town Hall, about the middle of April, 1888, at which there was a varied assortment of cooking and heating stoves, washers, boilers, &c. The hall and entrance were lighted by regenerative lamps and regulator burners. All the gas used was passed through two 30-light dry meters in glass cases. These were found exceedingly useful; and, when working, were not only a source of attraction, but were very serviceable in the way of letting intending purchasers see for themselves the actual consumption of gas. A young lady gave practical cookery lectures twice each day; an opportunity being given for all to inspect or purchase the various dishes prepared. At the end of each evening's lecture, the lecturer, with an enviable degree of tact and ability, dwelt on the superiority of gas over the ordinary fuel for cooking purposes; and at the same time announced the cost of gas used each day as indicated by the meters. This I may say had a beneficial effect, as the quantity of gas used was exceedingly, I might add, incredibly small.

With regard to the cost of the exhibition, we were fortunate in adapting the details of admission, &c., to local requirements. At the close we found that the receipts were almost exactly equal to the expenditure, which included gas used and every other expense, excepting the hall which is the property of the Commissioners. The immediate result of the exhibition was that there were hired out 10 cooking ranges, and 26 ranges, fires, &c., sold. By the end of the year, there were in use upwards of 70 of all classes, at which time I issued a pamphlet with local testimonials; and this led to the introduction of an additional 20.

The direct profit on the hire and sale of the appliances was practically *nil*. Our aim was to get as many stoves as possible into use; the profit being derived from the extra sale of gas. Comparing the consumers' accounts who adopted these appliances with their accounts for the previous year, it was found that the result was an increase in consumption of about 500,000 cubic feet, or 7 per cent. on the private sale. Fully one-half of the appliances out at the end of the year were in use for only six months; so that, by the close of the current year, the amount of extra consumption I have just stated will be very much increased.

It must be admitted that there is an element of risk in hiring out cooking ranges; but I cannot well see how otherwise the stoves can be introduced. It is quite natural that people should hesitate before spending £4 or more on an article they know little or nothing about, or are not sure until they try it that it will suit their purpose. This difficulty is removed when they can have it at so much per quarter; and it is found that the majority retain them. Indeed, after having a stove for some time, most people would not care to dispense with it. Of those hired out, four were returned at the end of the year; three being replaced by apparatus better suited to the requirements of the users. These four were hired out almost immediately afterwards; so that at the present time we have none on hand that have been returned.

I need not go into the details of working the business; but I should state that we do not let out a stove for a less period than one year to start with—the rental being paid in advance. Thereafter, if the stove is retained, the rent will be collected with the gas accounts. If this condition of paying a year in advance was dispensed with, and the stoves simply let for as short a period as the consumers wished, I have no doubt there would be a larger number employed. However, it is questionable whether this would be advisable. I am inclined to think not. If the rental is low enough, there will be sufficient inducement to pay for one year in advance; and a greater likelihood of the stoves being taken by those who would become permanent users.

When a stove has been fixed, while showing the consumers how to use it, I make it a special point to warn against unnecessary use of gas, and also endeavour to enlighten them in the mysteries of meter reading. Afterwards I pay two weekly visits, in order to ascertain the cost of each week's cooking, and so check any extravagance. This extra trouble I find is amply repaid by the increased satisfaction of the consumers, and the prevention of the stove coming out when the account goes in. There is little fear of this happening, however, unless gross carelessness is exercised in their use. With gas at our price—viz., 4s. 2d. per 1000 cubic feet (which cannot be called cheap)—I find that it can be, and is used at no greater cost, but with much greater satisfaction, than coal for cooking purposes. For heating, gas is certainly much more expensive, unless for intermittent use, or in special cases.

The employment of gas in the household and its attendant advantages are now so well known that it is unnecessary for me to enlarge on them, especially to this audience, to whom they are no doubt familiar, as they ought to be to every gas manager. But we should practise as well as preach, by having cookers and fires in our own dwellings. Example is often a much more powerful factor than a mere advocacy; and again the very fact of using these appliances ourselves is sufficient evidence that we really believe in the benefits we are so anxious others should avail themselves of. The introduction of these appliances not only aids us in selling more gas, but is the means of familiarizing consumers with the commodity we deal in, and so promote a good understanding between buyers and sellers. In these days of competition, we cannot attach too much importance to this aspect of the matter. We may not all have had to run against the electric light, but who has not felt the effects of oil, a most powerful rival at the present time.

The influence of the stoves on the consumption of gas in Coleraine is not yet very considerable, or as much as I would like. I am sure other towns have done better, and are more enterprising in hiring out engines and a variety of goods. We confine the letting out to cookers, but sell the other articles at cost price. The want of a suitable show-room, centrally situated, I find a great drawback. We have one at the gas-works; but our experience is that it is too far out of the way. The stoves require to be taken to the people; the reverse is rather a slow process. However, I am afraid we are on too small a scale to do other than we are now doing. The number of gas appliances in use is gradually increasing; and the experience of the consumers is of such a satisfactory nature that there is every prospect of their continuing steadily to grow in public favour.

Discussion.

The PRESIDENT was sure he was expressing the feeling of all present when he said that they were very deeply indebted to Mr. Stormonth for his interesting, practical, and instructive paper. He believed that, if properly worked, gas-stoves would become most popular. A great deal of success seemed to have attended the efforts of Mr. Stormonth in this direction.

Mr. WHIMSTER desired to make a few remarks, because he had had something to do with introducing gas-stoves in Armagh, where they took the same course as Mr. Stormonth seemed to have taken in Coleraine. They held an exhibition, and lectures were also delivered by a young lady lecturer, with very satisfactory results. A number of gas-stoves and working appliances were now out on hire. One obstacle in the way of these stoves was the carelessness and wastefulness of servants. His experience in Armagh and the neighbourhood was that the ladies were too little in the kitchen, and they left the stoves to the care of the servants, who in turn, left the stoves very much to themselves—allowing the gas to blaze away very often the whole day through without doing any work. Now if this careless practice were put an end to, he was quite sure that the use of gas-stoves would become a great deal more general. He thought it was a capital idea to scatter gas-cookers through a town, because a much larger consumption of gas was the result, and people were well satisfied with the way in which the cooking was done. In Armagh, beside the young lady lecturer to whom he had referred, he encouraged a local *restaurateur* to deliver lectures on cooking. He was supplied with the gas and all the necessary appliances for the purpose without cost, and with very good results. He (Mr. Whimster) thought that the results achieved justified any trouble or pains that a gas manager might go to in pushing gas-stoves into public notice.

Mr. GIBB enquired if there was much in the way of complaints as to insufficient or light pressure.

Mr. WHIMSTER said not. In any case where a complaint of the kind was made, he always found that it was the pipe and not the gas that was to blame.

Mr. GIBB asked what size of service was sufficient.

The SECRETARY said that he never put in less than a ¾-inch service direct.

Mr. STORMONTH, at the close of these remarks, said he was sorry that his paper had not excited greater discussion, because there were about it many points of importance and worthy of their careful attention. However, they would be able to read it at their leisure, and he hoped that it would be of assistance to some of them. He had explained the steps which he had taken, and which he thought were the best that could be taken for the purpose of pushing gas-stoves; and if any member wanted to do anything in that way, he would find it to his advantage to take the course he had taken—namely, to hold an exhibition, and have a series of cookery lectures. And, further, he would recommend any manager who intended to try it, to keep the whole business in his own hands—making all the arrangements himself, even to the smallest detail. In his opinion it was a very great mistake to let the local gasfitter put up the stoves. Gas managers should do everything themselves; and if they followed his advice, they would find the results to be most satisfactory.

The PRESIDENT said there was no doubt that the trade in gas-stoves would increase if only they were pushed properly.

Mr. T. FRIZELLE (Holywood) then read a paper entitled—

UNACCOUNTED-FOR GAS.

When consenting to note down a few ideas on the above subject, I did so in the hope that they might lead to a quiet and profitable conversation among the members. I cannot say I have anything startling to state, or perhaps even new to the majority of my fellow members, for I presume we all have more or less unaccounted-for gas; but if every member of this Association should refuse to give his ideas or experience on the different subjects in connection with our industry, unless he had some new elaborate invention to explain, where would be the necessity for our meeting together from distant parts of the North, at, to some it may be, considerable inconvenience? I presume we are not all gifted with brilliant inventive genius; but we have all our difficulties to encounter and overcome, and a slight review of these difficulties and how we met them would, I am certain, be most interesting

and instructive to the members generally. I, as a junior member, feel that some of our seniors should in this case lead the way, as it is certainly to be expected their large experience would be most beneficial and instructive.

There is a truism to the effect that gas profits are either made or lost in the retort-house. Now this is true so far as it goes, for if profit is not made in the retort-house it may not be looked for outside, yet the profit so made can be lost, and more, before the gas reaches its destination. To prevent this loss should be the earnest desire of every manager. In the first place, attention should be given to the station meter, to see that it registers correctly; for if the station meter is not correct, the calculation of loss cannot be estimated. If it registers slow, the leakage, &c., will follow all the same, besides the make per ton will also appear less. If it registers fast, the opposite will be the result; and at the end of the quarter, the leakage will be up accordingly. So then the station meter should be occasionally tested to see that it is telling the truth; and this can be done if no better appliance is at hand, by shutting off the outlet-valve at the back of the meter, tapping a 2-inch hole both above and below the valve, and connecting a large consumer's meter to it, so that the gas which passes through the station meter must also pass through the test-meter before it reaches the gasholder. It is, of course, essentially necessary that the test-meter should first be proved correct. Having proved the station meter to be correct, the next object of attention is the gasholder. I am convinced a greater quantity of gas is lost about gasholders than is given credit for—in one way by allowing the holder to fill too full and so blow off. Especially is this the case in works where the capacity of the gasholders is small when compared with the consumption. For instance, in the winter time before mills and factories are lighted up, the holders are charged to their utmost; and if the evening remains clear rather longer than usual, or the temperature rises, the gas must escape into the air. Or perhaps a fog has been hanging overhead, and suddenly clears off when the retorts are in full work—though I must say we are not so subject to fog as some of our neighbours across the Channel. In the summer time also, by reason of the sun bursting out after cool weather, up rise the holders perhaps a sheet or more, and if almost full previously, the gas is bound to get away. And in many other ways gas may be lost; as by careless attendants allowing the valve to remain open too long before changing a holder, or perhaps opening the wrong valve. This is most liable to occur in small works where one or two men are called upon to perform several duties, and their attention is thus divided. Now these may all appear simple and frivolous little matters to most of the gentlemen present; but attention to these little matters is sure to bring its own reward. Every work requires its own attention, according as the necessity arises; and strictness on the manager's part often prevents careless waste by assistants. But the greater quantity of unaccounted-for gas is laid down as leakage and condensation through mains and service-pipes, and very rightly so, especially if the mains have been improperly laid, or the joints and service-pipes carelessly connected. Strict attention on the part of the manager or superintendent while main and service pipes are being laid is undoubtedly necessary, and doubly repays the attention given afterwards. I wish to point out one way especially in which a great number of gas companies err, and that is by employing so-called handy labourers, who may not be accustomed to the work, to lay mains and services. I repeat, it is false economy to employ men of this description to do some of the most particular work. Few men of the class can be depended upon in the absence of an overseer. There certainly are exceptions, but they are few; and it is to be expected that if men of the sort I have described make a blunder, they will have it covered over as soon as possible, so that it may not be discovered for a very long time, and that is another drain on the profits day and night perhaps for years. I consider great error is made in this respect. "The best workman is certainly the cheapest"—an experience which is sometimes dearly bought. But there is another cause for leaky mains, which the workman, no matter how clever he may be, or how much care he may exercise when laying, cannot prevent in the ordinary course, and that is when the ground subsides. Especially does this occur when mains are laid down in newly made, filled in, or reclaimed ground, even after years; and also generally where mains are laid along roads reclaimed from the sea. A case of this description came within my own notice some time ago, where 15 joints in succession of an 8-inch main were leaking. The lead in some of the joints was drawn over ¼ inch, through which leakage was undoubtedly going on for some considerable time; but as the main ran just outside the works, the smell was usually put down as coming from there, and especially from the waste lime heap. To give an idea of the bottom on which this 8-inch main is laid, I may say that while a man stood in the trench to stave up the lead in the joint, he sank over the boots in mud; so in a case of this description, nothing is to be expected but drawn joints, leakage, and other difficulties to follow. Constant attention therefore is required.

The manner in which I generally localize leakage in the mains is by driving down a sharp-pointed bar alongside the main-pipe. In this manner I have tested over 2 miles of main in one direction in a few weeks; and detected and stopped 39 leaks, some of them very considerable, and strange to say all were from faulty joints. In but one instance was the pipe broken; and this happened, I believe, by the root of a tree springing the pipe during a storm. No doubt the leaks from some of the points were small; but taken together they produced a very considerable and constant loss, and each of them lit above ground when a light was applied after tapping. There are other ways of detecting leakage from mains—one being by the use of patent syphons. They act as syphons or wells and leak detectors when required; and I am sure save a lot of trouble. And there are also gas leakage indicators which are supposed to show where a leak exists by simply carrying the indicator over the ground. I have not used any of these, as so far the pointed bar has answered my purpose. In passing, I may mention one leak which gave me some little trouble to find from what part of the main it was coming. I had no difficulty in finding the smell, nor in getting a light above ground (this invariably took place at a rise of ground). So I had the main stripped for yards; and thereby came upon an old built sewer, which had been unused for years. Out of this sewer the gas was coming. I therefore came to the conclusion that the gas was perhaps getting into the sewer at the foot of the hill or wherever the main crossed the sewer; and in this I was right. I found that the gas from two leaky joints made its way into the sewer, and was thereby conveyed to the higher level 150 feet distant. I consider it necessary that periodical testing should be made on any gas-main, and too long a time should not be allowed to elapse between testing. The effect of excessive pressure on the gas in the mains is the cause of increased leakage; and when a proper supply cannot be maintained in any district without this pressure, the sooner a larger main is laid the better and more profitable it will be for the gas company.

Now, in regard to service-pipes. Some authors have laid down 10 years as the life of a malleable-iron service-pipe in the ground; holding that at the expiration of that time all service-pipes should be renewed. That may be so where the soil has a peculiar oxidizing effect upon the iron; but generally the service-pipe is kept in for 15, and sometimes 20 years, unless in case of alteration, or until it shows signs of leakage. Now this should certainly not be allowed, for leakage may be going on for years out of a service-pipe before it is detected; and it is astonishing how soon some service-pipes are honeycombed with rust unless they are specially protected—for instance, when they cross or run through a sewer, as is sometimes the case. I repeat, gas may be getting away for years in this manner without being detected. But I consider every district should be judged according to the nature of the soil and other considerations; and on the very first appearance of weakness, a complete renewal should be effected. In some of the large English towns, the services are laid in a wooden trough and covered over with boiling pitch, which should certainly protect them and repay the extra expense in laying. I find the service-pipes to the public lamps another source of leakage, especially the tube in the pillar. I have renewed a large number which I found in a much worse state indeed than the pipe under ground; and I am of opinion the reason was, this tube is more exposed to the oxidizing effect of the atmosphere and rain trickling down from the top of the pillar. Another way in which gas is unaccounted for is by reason of the burners of public lamps passing more than the stipulated quantity; and this usually takes place where lamps are placed on a higher level, without a governor or regulator being connected to them. But altogether apart from the levels of different lamps, without a governor or regulator it is impossible to procure common burners which will pass the one quantity of gas, although numbered alike. There may be such; but I confess I have never met with them. Therefore it is the more necessary to have regulators on all public lamps, high or low, so that all may pass a like quantity.

In conclusion, I would say strict attention should be paid to the meters. I think, in general, wet meters especially do not receive that attention which is necessary. I consider 3 months certainly too long a time for a wet meter to run without attention, especially in the lighting season. A great deal depends upon what a meter is called upon to do; and in regard to this, I would say it is false economy to place a 3 or 4 light meter to supply gas for 10 or 12 burners, apart from the unpleasantness caused to the consumer by the light popping out, it may be when his shop is full of customers, or when he is entertaining company and all available burners are lighted. This is one of the chief sources of prejudice which consumers generally have against wet meters. I am sure, apart from the discomfort to the consumer, this is another way in which gas is unaccounted for.

Now, these little matters taken singly may not produce a great change in the leakage account. But there is an old Scotch saying: "Mony a mickle mak's a muckle;" and attention to all these little matters is so much money saved, and at the end of the year the result would no doubt show for itself.

Discussion.

Mr. STORMONTH said the Association were indebted to Mr. Frizelle for the very comprehensive view of the leakage question which he had given them in his able paper. It was a subject of the greatest importance, and any information which would assist them in their endeavour to keep the leakage at a minimum would be warmly received. He agreed with Mr. Frizelle that the best labour was the cheapest in the long run; and in his opinion it was a great mistake to employ that useless machine, the handy man. He had had experience in that way, and that was his opinion. There was one point upon which he would like a little information, and that was as to the saving which Mr. Frizelle made. It should be very considerable, and he hoped that Mr. Frizelle would be able to give them this interesting piece of information.

Mr. WHIMSTER said he was compelled to get up and say a word in defence of the "handy man," who had just been the recipient

of so much abuse. He objected to the epithet of a "useless machine," as applied to him; and he was of opinion that a good handy man was better for laying mains and services than a mere tradesman. Perhaps he might be slow, but he was sure; and the work was well done in the end.

Mr. STORMONTH said that there were exceptions to every rule.

Mr. ROBB (Cinderford) said he was laying mains at present, and the work was well done by a man whom he had himself taught. The manner in which he did his work gave every possible satisfaction.

The PRESIDENT said that he also had a very good man. His leakage at one time amounted to about 40 per cent.; but he had now been able to reduce it very considerably. He sent a man smelling at the tops of the lamps, and found that there was a very considerable escape in that way, as the lamp-post formed a sort of funnel or chimney through which the gas escaped. He had now managed to get the leakage down as low as 5 per cent.

Mr. ROBB: That is exactly my leakage.

The PRESIDENT: Yes; but you did not commence with about 40 per cent.

Mr. FRIZELLE said that with regard to the "handy man," there were of course exceptions to the rule; but generally he adhered to the opinion he had expressed. He found that if they made a mistake they would cover it over, and say nothing about it—with the result that very often leakage went on for years undiscovered. He was merely speaking of the handy labourer as he found him. With reference to the question of saving, he wished to say that last year he made 670,000 cubic feet more gas than in the previous year, and he carbonized last year 38 tons less coal than in 1888. He thought this proved very conclusively that the question of leakage was a highly important one, and should be looked to.

Mr. WILLIAMSON asked Mr. Frizelle if there was any change in the quality of the coal.

Mr. FRIZELLE: No; we used the same coal from the very same coal merchant.

[After the reading of papers by Mr. A. Gibb (Newry) and Mr. R. Ross (Dungannon), the remaining business of the meeting was proceeded with. We conclude our general report to-day, reserving the two papers just alluded to, and the brief discussions that accompanied their reading, till next week.]

The PRESIDENT said there was one matter that had not yet been considered, and which they should settle before the meeting concluded. This was the question of the place of meeting for next year. He would be glad to hear any suggestions that members might have to make on the subject.

The SECRETARY proposed that the Association should meet in Newry, as a compliment to their new President, Mr. Gibb.

Mr. SMITH seconded the resolution, which was passed unanimously.

Mr. D. D. MACPHERSON (Manchester) said that a very pleasing duty fell to his lot to discharge; and that was to propose that the best thanks of the members of the Association should be given to their President, Mr. Featherstone, for the very kind and hospitable manner in which he had received them upon this occasion, and also for the very able address which he had read that day.

Mr. STORMONTH seconded the resolution, saying he was sure he was only giving expression to the feelings of everyone present when he said that the manner in which Mr. Featherstone had discharged the duties of the office of President had given them the highest satisfaction.

The motion was passed by acclamation.

The PRESIDENT said he had to thank the members very heartily for the kind manner in which they had received the vote, and Messrs. Macpherson and Stormonth particularly for the kind words they had made use of in submitting it to the meeting. He also wished to take the opportunity of conveying to the Association an expression of regret on the part of his Directors that they were unable to be in Dundalk to receive the members on the occasion of their visit. They were all away from the town; otherwise they would have been present to receive the members. His Directors were glad that the members of the Association had visited Dundalk, as they no doubt thought that the visit would do him (Mr. Featherstone) a great deal of good.

Mr. GIBB thought it would ill become them to separate without passing a warm vote of thanks to their worthy Secretary and Treasurer for the admirable manner in which he had discharged the duties of those offices during the past year. It was only necessary to look round that meeting for an eloquent testimony to the energy and ability which Mr. Whimster had thrown into the work.

Mr. STEARS, in seconding the vote, hoped soon to see Mr. Whimster appointed Secretary of "The Irish Association of Gas Managers."

The PRESIDENT, in putting the vote, said that it was well deserved, and he was glad to add a word expressive of their high esteem for Mr. Whimster.

The vote was passed by acclamation, and duly acknowledged.

The proceedings then terminated; and the members and a few friends afterwards dined together in the Queen's Arms Hotel.

MR. G. W. HICKS, late assistant to Mr. V. A. Valon, at the Ramsgate Corporation Gas-Works, has been appointed Manager of the Ascot District Gas Company, in succession to Mr. John Gandon, who is shortly to proceed to fulfil his engagement with the Ottoman Gas Company, at Smyrna.

NORTH BRITISH ASSOCIATION OF GAS MANAGERS

THE PAPERS AND DISCUSSIONS.

(4)

NOTES ON PURIFIERS.

By J. HALL, of St. Andrews.

In 1851 the yearly make of gas at St. Andrews was 3,706,000 cubic feet, and the purifiers consisted of three boxes, each 6 ft. by 3 ft., or an area of 18 superficial feet. The three boxes were set in line; and before any of them could be charged, the make of gas had to be stopped. The result was a great waste of lime; 39 tons being used in one year. In 1854 the make of gas was 4,191,000 cubic feet; when a 4-feet box was added to the purifiers, and arranged with two four-way hydraulic valves, which permitted of them being worked in pairs, or all four at one time. This was a saving of time and labour. These continued until 1860, when two purifiers were erected, each 12 feet by 6 feet, equal to an area of 72 superficial feet. The maximum make of gas was 32,000 cubic feet per 24 hours, and 6 million cubic feet per annum; the lime used being 35 tons. In 1869 a third purifier of similar size was erected; the maximum make of gas being 56,000 cubic feet per 24 hours, and 10½ million cubic feet per annum, and the lime used being 104 tons. In 1875 a fourth purifier, similar to the others, was erected; the maximum make of gas being 75,000 cubic feet per 24 hours, and 13,855,900 cubic feet per annum, and the lime then used being 94 tons.

The two first purifiers erected gave an area of over 2 superficial feet per 1000 cubic feet of gas made in 24 hours; and when all the four were erected, the area was less than 1 superficial foot per 1000 cubic feet made, and the cost of purification had risen from 868 cubic feet for 1d. in 1860 to 462 cubic feet in 1875.

In 1881 the make of gas had increased to 18 millions. In this year oxide was introduced; and only 73 tons of lime were used, reducing the cost of purification (lime and oxide only) to 1474 feet for 1d. The oxide was used with lime in equal proportions, and always first, the lime last, and the gas passing down through the purifiers. This reduced the back pressure, and assisted the purification very much. Still the purifiers required very frequent changing; the lime not being fully used, and the oxide too much so—rendering it, with the area at command, difficult to revivify.

In 1882 the scrubber was filled with boards, and a washer of three compartments was erected (the former, occasionally supplied with liquor, also assisted the purification very much). In 1884 an engine and pump were erected; and in 1885 a second pump was added, which kept a continual stream of liquor passing through the boards and greatly aided in reducing the cost of purification. In 1888 the make of gas was 22 millions. The lime used was 48 tons, and upwards of 2000 cubic feet of gas were purified for 1d. This was fair, so far as cost for lime and oxide was concerned; but the superficial area of the purifier being only 72 feet, while the maximum make of gas was 121,000 cubic feet per 24 hours (there being no exhauster), the pressure was excessive, and the oxide was quickly fouled and labour increased by often changing the purifiers and risk of the gas not being clean. The four purifiers were erected in a line—this arrangement suiting the limited area of ground available. They were connected with 9-inch pipes and six four-way plug cocks; and though in pairs, with a little care they could be worked almost continuously.

In 1888 it was considered advisable to increase the size of the purifiers; and four, each 16 ft. by 10 ft. 6 in. were erected in a line, in every way similar to the four smaller ones, as the size and position of the ground suited such an arrangement. The space occupied by the new purifiers was 57 feet by 26 feet, and was 14 feet below the level of the present works. The connections were 12-inch, with six of Anderson's patent four-way valves. A platform was erected all round the purifiers, at the level of the bottom of the water-lutes, in such a way that the joints and valves could be easily examined and cleaned. This platform constituted also a bearing for the rails on which ran the hydraulic traveller used for lifting the covers of the purifiers.

Over the four purifiers and station meter, which occupied the whole length of the ground—viz., 65 feet by 26 feet—a floor was formed by joisting and flooring laid over five wrought-iron beams 12 ft. 6 in. above the platform round the purifiers. This floor was for revivifying the oxide when taken out of the purifiers, and returning it again, through hatchways over the centre of each, by means of a hopper and hose, so that a workman in the purifier could spread it without further labour. A small crab winch fixed to the floor, and a block shifted over the centre of each purifier, are used in hoisting the oxide up to the floor to revivify.

The purifier-house had walls on one side and both ends, with openings filled with louvre boards for air; but on the side next the works it was all open to the level of the side walls. The waste lime was removed from the purifiers by wheelbarrows to the court on a level with the lower side of the purifiers; and as the oxide floor was nearly on a level with the present works, the lime was wheeled from the lime store across a gangway, and filled into the purifiers through the hopper already mentioned. The purifiers are each supplied with three tiers of wood trays; but in the meantime two trays only are used (there were three trays in the smaller ones). The bottom one had 8 inches of lime, and the upper one 12 inches of oxide; and the gas passes downwards—the lime being always last.

The pressure in the small purifiers with the 9-inch connections was often up to 8 inches; in the larger purifiers, with 12-inch connections, 2½ inches was the maximum. While each of the small purifiers was changed 14 times in a year, the larger ones were only

changed four times in a like period. The cost for lime and oxide for the smaller purifiers was £43 16s.; the cost for lime and oxide for the larger ones was £27 16s. 8d. To this must be added the saving of labour from only changing 16 purifiers instead of 56, and the security of the gas being always clean. Though the purifiers were larger—viz., 320 superficial feet against 216 superficial feet each—the facility for emptying and filling the larger ones made the labour lighter, though a little longer time was required for each change.

These few general notes are intended to show the advantage of large purifiers, in the saving of materials and labour, in reducing the pressure, and in the security given for the purity of the gas. The superficial area of each of the new purifiers is 160 feet; and it is capable of purifying easily 200,000 cubic feet of gas per 24 hours, taking Mr. Newbigging's rule—viz., the maximum daily make of gas per 24 hours, expressed in thousands, multiplied by the constant 0·8 as the superficial area of each purifier, when three are on and one is off. The connections are 12-inch, following the rule of the diameter in inches nearly equal to the square root in feet of the area of the purifiers. It is often difficult for managers of small works, when the area of the ground is limited and the finances are low, to procure plant sufficiently large to result in economical working, and secure that the gas shall be properly purified so as to keep down complaints; and not unfrequently the purifiers are the most faulty of all the apparatus, although they are not the least important.

I may further add that the purifiers are placed at a distance from the condensers, scrubber, and washer, the connections to which are all 9 inches in diameter, while from the last-named to the new purifiers the pipes are 12-inch. This is a relief to the pressure; and a tar-box being placed on the pipe before it enters the purifiers, keeps back all tar or liquor which the force of the gas may have carried forward. In the small set of purifiers, I had to contend with the tar being at times carried forward and deposited on the top sieve of the purifier, on account of the apparatus being all so closely located. As a preventive, I had a dsquare box placed, with good results, on the leading pipe, and ivi ded it with three perforated partitions, so as to retard and break the flow of the gas after it left the washer, and before it entered the purifiers. A layer of ashes on the top of the lime has also been found very effective in keeping back the tar, and rendering the lime less liable to cake.

I am afraid this paper does not contain anything new, and to managers of large works can be of little use. But it may give a few members a hint, and induce them to prepare a paper, however short, on some part of the practical management of the gas-works under their care. Though the manufacture of gas in large and small works is on the same lines, yet every manager has an experience of his own under the circumstances in which he may be placed; and amid great similarity, there may still be great diversity. Most managers have had experience of small purifiers and their disadvantages; and though it is not the good fortune of all of us to have had like experience of the advantages of ample purifying space, yet from the foregoing notes I do not think you will fail to see how great are the advantages. Among a few of the chief may be mentioned the following:—Great saving in purifying material; every particle of it being thoroughly fouled. Saving in labour; the purifiers serving longer. Absence of trouble and worry caused by the irregular working of the purifiers. Reduction in back pressure. The gas also goes slowly through the purifiers; thus giving time for the various chemical changes that take place at this point of the process. Altogether the change has been a very agreeable one, and the results, to say the least of it, are surprising—a saving of 38 per cent. being shown in the cost of purifying material.

Before leaving my subject, I would just add that where oxide and lime are used in purification, it is possible to purify a larger quantity of gas with a smaller purifying area than where lime alone is used. This at least has been my experience; and I doubt not also that of some others present. I have heard it stated that as much space is required for lime and oxide—in fact, even more space than with lime alone. I did not find it so, but rather the reverse; and had I not introduced oxide early, as I did, I should have required larger purifiers many years ago.

Discussion.

Mr. J. Adam (Pollokshaws) said that personally he felt very much indebted to Mr. Hall for his excellent paper, from the fact that he (Mr. Adam) had undergone similar experiences. Nothing militated so much against the interests of a gas company as having improper apparatus. Some eight years ago he was very much annoyed with an old set of purifiers. All the gas he could get passed per ton of lime was only 118,638 cubic feet. The superficial area of his purifiers was only 12 ft. by 6 ft., and they had two of them. He recommended his Directors to have larger purifiers, as those they had were altogether unfit for their work. So much annoyance did these purifiers cause, that on several occasions they had to change them during the night, in the dark. They procured new purifiers with an aggregate superficial area of 558 feet, and the gas purified by them per ton of lime was 201,072 cubic feet—an increase of 82,434 cubic feet, or fully 69 per cent.

Mr. W. Key (Tradeston, Glasgow) called attention to what he regarded as a discrepancy in stating the area. Some of the purifiers had 2 feet depth, and yet the area was stated in superficial feet. He thought it would be more correct if they had a rule for estimating the area of purifiers—say, by stating the cubical contents instead of the superficial area, because they could never arrive at the depth of lime used. His idea was they should get into the habit of quoting the capacity of purifiers by their cubical contents of lime.

Mr. J. B. Terrace (Brechin) thought they should know the cubical contents as well as the superficial area of the purifiers. It was all superficial at present; but he considered they should come round to the cubic space, because of the differences of depth. In his case he had two sieves. The depth and the area might vary, and yet they might have the same cubical contents in the purifier. He passed between 300,000 and 400,000 cubic feet of gas through his purifiers, which were about the same size as Mr. Hall's. Mr. Hall had only about 8 inches of back pressure in his old purifiers; and in this respect he got off better than many. He (Mr. Terrace) more often had 18 than 8 inches of back pressure; and, of course, there might be a choke of which he did not know. He should like Mr. Hall to tell them how much gas he passed through each purifier.

Mr. T. D. Hall (Montrose) said he was not troubled with back pressure when the purifier was properly filled.

Mr. Key asked if Mr. Terrace wetted his lime. If he did until it stuck to his fingers, he would have no difficulty with back pressure. Some years ago he (Mr. Key) carried out an experiment. He made a small purifier, and put into it dry powdered lime. He noticed the time it required, in minutes and seconds, to empty a small holder, and found that when the lime was wet the holder went down immediately, whereas when the lime was dry it took ten or twelve times as long to pass. For the last twelve or fourteen years he had riddled all his lime, thoroughly saturated it, and made it into the shape of peas or beans; and the gas went through with the greatest ease. If Mr. Terrace put in 2 feet of lime prepared in this way, he would have no difficulty.

Mr. A. MacPherson (Kirkcaldy) asked what the result was with regard to purity. Mr. Key would certainly, by his plan, make a passage for the gas through the lime; but whether he got contact was another thing.

Mr. Key replied that one-third more gas was purified with wet lime than with dry. The volume per ton was nearly doubled.

Mr. Terrace remarked that he wetted his lime, but did not riddle it.

The President said he was sure they were much indebted to Mr. Hall for bringing this subject before them. He was glad to see that he had adopted the plan of passing the gas down through the purifier. The space he had allotted to the new purifiers seemed to be a pretty liberal one. If he had 2 feet upon the superficial area, this amounted to 6 feet upon the three purifiers. He should say that new plant should have 4 ft. 3 in. or 4 ft. 6 in., which was more than Mr. Newbigging allowed. He had proved to demonstration the immense economy to be derived from the larger area. He was so satisfied of this, that he should never think of allowing it to go back to anything like the usual rule, which was 2 feet. He thought Mr. Key was wrong in speaking of cubical contents instead of superficial area.

Mr. J. Hall supposed Mr. Key meant the cubical area of lime in one purifier.

Mr. Key explained that he meant the quantity of gas passing per ton of lime.

Mr. Hall said the area he gave was that of one purifier alone; but, of course, he was working three in the usual way. The area of one purifier was stated; and he thought it was the right way to treat of the superficial area. He remembered about nine years ago, when Mr. M'Crae went to Dundee, he had great difficulties with his purification, because the output of gas was increasing very much, and he had purifiers divided in the middle. This was a mistake; and he took out the middle partition, and then the purifiers were greatly improved, simply because he had a larger area. The main object of his paper was to show the great advantage of large purifiers; in fact, he thought that managers could not have them too large.

The Forthcoming Meeting of the British Association.—The proceedings at the forthcoming meeting of the British Association which will be held in Newcastle-upon-Tyne from the 11th to the 19th prox., are expected to possess more than the usual interest. At the first general meeting, on the 11th, Sir F. Bramwell, F.R.S., will vacate the chair, and the presidency will be assumed by Professor Flower, C.B., F.R.S., who will deliver his inaugural address. The different sections will assemble on the following morning for the reading and discussion of reports and other communications. The papers likely to be of interest to our readers will be presented in the Mathematical and Physical Science Section, the president of which will be Captain W. de W. Abney, R.E., C.B.; the Chemical Science Section, over which Sir Lowthian Bell, F.R.S., will preside; and the sections devoted to Economic Science and Statistics, and Mechanical Science, which will be under the presidency of Professor Edgworth, M.A., and Mr. W. Anderson, M. Inst. C.E. On Thursday evening, Sept. 12, there will be a *soirée*. On the following evening Professor W. C. Roberts Austen, F.R.S., will deliver a discourse on "The Hardening and Tempering of Steel." On Saturday evening, Sept. 14, Mr. B. Baker will give a lecture on the Forth Bridge. On Tuesday evening, Sept. 17, there will be another *soirée;* and the concluding meeting will be held on the afternoon of Wednesday, Sept. 18. Excursions to places of interest in the neighbourhood of Newcastle-on-Tyne will be made on the afternoon of Saturday, Sept. 14, and on Thursday, Sept. 19. The Local Secretaries are Professors P. Phillips Bedson, and J. H. Merrivale.

Register of Patents.

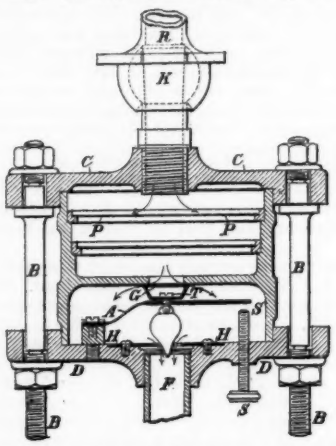
STARTING GAS-ENGINES.—Preis, E. F., of Hulme, Manchester. No. 10,984; July 30, 1888. [6d.]

This invention of means for starting gas-engines, hot-air engines, &c., is particularly applicable when such engines are employed to propel tramcars, or when used as locomotives.

It is proposed to combine with the aforesaid engine a hydraulic engine; the water for working it being contained in a holder or accumulator partly filled with compressed air. When it is required to start the gas-engine, the piston of the hydraulic engine is put into motion by opening a valve, so as to allow water which is under compression in the holder to pass into the hydraulic-engine cylinder, and thus communicate motion to the gas-engine. After the gas-engine has been thus started, the communication between the water under compression in the holder and the hydraulic engine is cut off by closing the valve; and the water which has been used in working the hydraulic engine may then, if desired, be forced back into the holder, so as to recompress the air contained in the holder or accumulator. By reversing the action of the hydraulic engine, a force-pump could be formed for this purpose.

GAS-REGULATORS.—Leisner, H., of Berlin. No. 12,647; Sept. 3, 1888. [8d.]

This invention of a gas-regulator has for its object so to regulate the section of the gas-passage to (say) a burner that the section automatically increases when the pressure of the gas becomes less strong, and consequently a larger quantity of gas is allowed to pass.



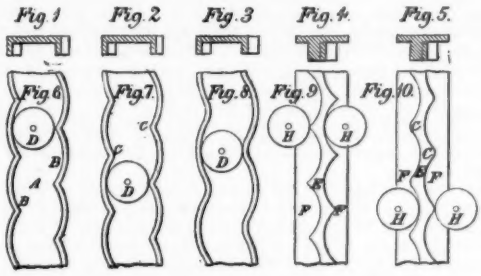
The regulator consists of the cylindrical casing closed by covers C and D. The cover C is connected with the gas-inlet tube R by means of a common ball-joint K; and the cover D is secured to the gas-tube F which feeds the lamp. In the casing there are two or more sieve-plates P for the purpose of retaining and sucking up the impurities of the gas. Under these sieves a wall is arranged provided with a hole. In the space of the casing shown is fitted a spring A with a plate to which a bell G is screwed on the one side and the stopper on the other side. This stopper fits into the opening of the valve-seat plate H, arranged in the bottom cover D of the casing. By means of the spring having the two closing mechanisms just referred to, the regulation of the gas-passage is effected. The vibration of the arm A is limited from below by an adjustable screw S. The stopper is hinged to the spring-lever A by means of the screw T.

In the position of repose the bell G closes, by the force of the spring A, the outlet passage of the plate; but when the gas-cock attached to the gas-tube F is opened, the pressure of the gas lifts the bell G off the opening. By means of the adjustable screw S, the closing is adjusted to a certain section from below by the pressure of the gas passing through the regulator-case, which forces the spring lever (as well as the pending stopper attached to it) down, so that the gases may pass in beside the stopper through the adjusted section of the passage and feed the lamp. The section of the passage diminishes automatically, when the pressure of the gas increases, on account of the spring-lever and stopper being pressed down. But when the pressure of the gas becomes lower than usual, the force of the spring lifts the stopper, and the section of the passage increases; so that, in spite of the lower pressure of the gas, nearly the same quantity is allowed to pass.

GASHOLDER GUIDING APPARATUS.—Livesey, G. T., of Old Kent Road, London, No. 13,057; Sept. 10, 1888. [8d.]

A general description of this invention was given in a paper read by the patentee last November before the Southern District Association of Gas Engineers and Managers (See JOURNAL, Vol. LII., p. 846.)

The inventor, in his specification, says that the object of his invention is to secure vertical stability in the ascent and descent of gasholders when the guide-framing is wholly or partially dispensed with. Under ordinary conditions, the guide-framing is necessary, mainly, because the vessel when in action is floating, and consequently very liable to tilt on one side. To avoid this defect, it is proposed to use an arrangement whereby the rollers on the bottom curb are compelled to rise or fall uniformly; and thus prevent some of the rollers rising or falling while others are either stationary or moving in an opposite direction. By adopting this plan gasholders may, it is said, be safely guided and kept upright by rollers or their equivalent attached to the bottom curb only. In ordinary gasholders, the rollers on the bottom curb work on plain guides, usually of channel iron, fixed to the wall of the tank. These, it may be remarked, may either act radially, as is the universal practice in England, or tangentially as in France, or both radial and tangential rollers may be combined.

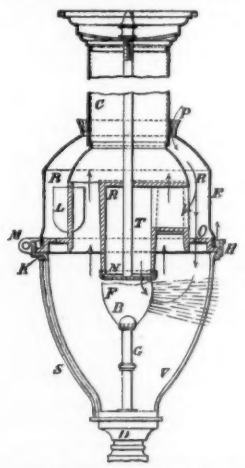


Figs. 1 to 5 are sectional plans of figs. 6 to 10 respectively. Fig. 6 is an elevation of part of a guide A having alternately projecting and hollow or curved cheeks B. Fig. 7 is similar to fig. 6, with the projections C somewhat rounded off. Fig 8 is also similar in practical use to fig. 6; but in this case the curves are increased in radius and the projections are also made more rounded than in the previous illustrations. In figs. 6, 7, and 8 there is shown a tangential roller D, which is fixed to the bottom curb of the holder. Fig. 9 is an elevation of part of a solid guide E with its flanges. Fig. 10 is similar to fig. 9, but having the projections C rounded. In both figs. 9 and 10 H represents the tangential rollers, which are fixed to the bottom curb of the holder.

To effect the object of this invention, there are placed around the interior of the tank a number of either channelled guides A, or solid guides E. If channelled—as in figs. 1, 2, and 3, and 6, 7, and 8—the two interior opposite sides of the channel are formed with alternate hollows and projections; the curve of each hollow being epicycloidal, or that of a revolving or rolling cylinder of the same diameter as the roller to be used in conjunction with it. If the solid form of guide be employed, then the two outer opposite sides have alternate hollows and projections of the same curvature as those just described. To the bottom curb of the holder rollers D are fixed tangentially, either working singly between the two cheeks B, of each channelled guide, or with the rollers H in pairs working on the outside of a solid guide E. When the rollers work singly, the curved or zig-zag channel is made just wide enough to allow the roller D to pass upwards or downwards freely with no play; and when they work in pairs, as H, they are placed just far enough apart to pass freely up and down outside the solid guide without looseness or play. The projections C on the guides are preferably made equal to one-fourth of the diameter of the roller. This answers the purpose, and leaves a clear path in the centre of the channelled guides equal to half the diameter of the roller. It will also permit the use of an ordinary radial roller in the same channelled guide.

GAS-LAMPS.—Rey, H., of Brussels. No. 17,516; Dec. 1, 1888. [8d.]

This invention of a gas-lamp consists in constructing it so that it will produce a flame in the form of a tulip, which directs the light chiefly horizontally—in contradistinction to the lighting obtained with lamps having horizontal or inverted flames, whether supplied with gas from above or below, and which are arranged to give light vertically.

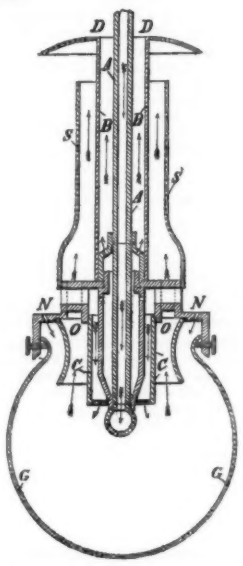


B is the burner, screwed to a vertical tube G fixed to the holder D below. To the holder is fitted the neck of a glass globe V, the upper end of which rests against a circular projection K on a ring H supported by rigid rods S. The ring also supports the air-distributor R, the outside of which is formed by the upper part E of the lamp. The distributor is surmounted by the chimney C. These parts are connected to a ring H by means of a hinge M, on which they are turned when the burner has to be ignited. The parts can, however, be connected to the ring H by a pin or projection on the casing E taking into a groove in the outside of the ring. As the parts of the distributor and ring in contact at I are turned in a lathe, and the burner-tube G is concentric with the ring, the distributor always takes up the position assigned to it in the axis of the burner; and the centre of the grating N at the bottom of the distributor thus corresponds exactly with the centre of the flame. The distributor is composed of an uneven number of flues or passages R, of V-form, which leads to a central tube or channel fitted with a grating N. This grating, which should be fine, is attached to the distributor and to the chimney by the rod R. The air for feeding the flame enters at P, and becomes heated in passing through the distributor, in the walls of which are cast or fitted thin conducting-pieces L for facilitating the exchange of temperature between the products of combustion and the

cold air. Part of the air thus heated flows through the central channel, goes to the centre of the flame, and retards the ascending movement of the gas; the combustion being thus effected under a moderate speed. The rest of the air passes through the orifices O into the globe V, where, after having lost its initial velocity by friction against the side of the globe, it flows upwards and feeds the flame externally. The gaseous mixture is thus effected at the lowest possible pressure; and this contributes to economy in gas lighting. Under the combined action of the internal and external currents, the flame, which is slightly expanded originally, opens out in the form of a tulip, the edges of which are attracted towards the edge of the channel. The attraction between the red-hot metal and the incandescent sheet is said to give the flame F great fixity without the aid of a "former," and permits of extending the illuminating zone up to the grating N. It is thus that the luminous rays are chiefly transmitted horizontally. The contact of the flame with the red-hot metal is not absolute; a thin layer of air separating them, through the intermediation of which the luminous combustion is effected up to the upper part of the flame—that which is near the edge of the central channel. It is to the combination of the different parts contributing to the draught that the special configuration of the flame is asserted to be attributable—that is to say, "the appearance of a luminous tulip."

REGENERATIVE GAS-LAMPS.—Stern, W., and Mücke, J., of Berlin. No. 8163; May 16, 1889. [6d.]

Alluding to this invention, the patentees say that in regenerative lamps, as usually made, it has been found that inconvenience arises from the gas being previously heated to an excess, which induces partial decomposition, so that particles of carbon are set free, and the gas-tube and the burner are choked up. In those regenerative lamps, therefore, which work with a descending air and gas supply, and with a jet turned downwards and projecting outwards, the patentees propose to use a small portion of the air introduced within the internal chamber of the lamp to keep the gas-tube cool, by turning this small quantity of air in an ascending direction.



The gas-tube A is surrounded in its whole length with a tinplate jacket B, having a continuation below. The flame passes through a second jacket S, placed round B. The remaining parts of the lamp may be supposed to be generally known. The air needed for combustion, having been drawn in through the chimney, enters the interior of the lamp proper through a series of apertures placed around it. Within the body of the lamp, the current of air is divided. The air required to keep up the flame descends the casing C, in order to reach the gas issuing from the burner. In combination with this gas, it becomes a flame, which finds its egress in the space between B and S. A small quantity of the air passes through apertures into the part of the casing surrounding the lower portion of the gas-tube. This air enters the jacket B through apertures, and finds its egress through an aperture D, which is either from the first reduced in size, or furnished with a regulating apparatus, or else covered in with a plate containing a number of perforations. In this way only a specified small quantity of air can constantly escape in an ascending direction so as to surround the gas-tube A; thus preventing any injurious heating of the gas as it descends. The second lot of air required for combustion is introduced into the globe G through the apertures N.

APPLICATIONS FOR LETTERS PATENT.

12,447.—HOELLJES, H., "Improvements in and in the methods of operating gas-engines." Aug. 6.

12,472.—THOMPSON, W. P., "Improvements in or relating to gas engines or motors." A communication from H. C. Covert. Aug. 6.

12,498.—ASPINALL, J. A. F., "Improvements in arrangements and apparatus for controlling the supply and consumption of gas for lighting railway vehicles." Aug. 6.

12,508.—HARPER, J. R., and LILLY, J., "Improvements in and relating to gas-engines and air-pumps or compressors, and in their adaptation in combination to apparatus for the production of gas." Aug. 6.

12,584.—MAIN, R. R., MAIN, A. P., and DARWIN, H., "Improvements in gas-fires." Aug. 9.

12,663.—STOTT, J., "Improvements connected with gas-governors." Aug. 10.

Correspondence.

[*We are not responsible for the opinions expressed by Correspondents.*]

OUTSIDE STOPCOCKS AND WATER-WASTE DETECTORS.

SIR,—Mr. De Normanville's correction (*ante*, p. 216) does not add anything to the question at issue. I suppose the Leamington authorities, unlike the Portsmouth Water Company (the case I quoted) do not consider it worth while to expend money in fixing stopcocks to every supply, which would make their system of waste detection quite perfect and most simple. Surely there are no managers or inspectors of water-works who do not endorse the opinions expressed by your correspondents that stopcocks are necessary; but the question has been asked, Who shall be responsible for accidents arising from the use of these appliances. Some companies compel the owners of houses to provide them (see the recent case at Folkestone); but as Mr. De Normanville states that stopcocks are necessary for the perfect working of the system, no doubt he will obtain the sanction of the Mayor of Leamington to fix the remaining five-sixths requisite, and at the same time take over the liability for all accidents arising from their use, and also keep them in constant repair, which will be no small item of expense. My opinion is that you cannot compel the owner of premises to fix stopcocks in the pavement, nor repair boxes or pipes. Then what kind of stopcock box is to be used? No doubt the Southwark and Vauxhall Water Company's box is as good as that of the Waste-Water Meter Company; but the former Company had to pay for the accident caused by a box which was of their pattern, but not their property. Your correspondents do not touch on this subject, but write testimonials for the Waste-Water Meter Company. Every intelligent turncock who may have read the JOURNAL knows the machine and its uses so often described in its columns.

Mr. De Normanville says that he would much sooner have the meters without the stopcocks than the stopcocks without the meters, so far as detection of waste is concerned. Stopcocks are advocated by the patentee and by all companies using the system; and many are putting them in at great expense. I have no doubt Leamington will follow. Mr. De Normanville also states that "if one is dependent on stopcocks alone for the detection of waste, he must sound every stopcock in a district to ascertain the condition of that district. Quite so; and that is my experience with waste meters. I may hit on the right house early, or I may go on to the last house before I find the leak; but I know at each stop-tap that I am getting nearer the defect. The meter will not indicate that, nor will it, as Mr. De Normanville says, "point out where waste does exist." It will point out that waste exists in a certain district; but it will not tell me if it is at the top of the street or at the bottom, and I am left to find out all defects, as I have done for the last thirty years, by the aid of the stethoscope and division cocks. I do not require picture-books and papers to show how much, and at what time, the water is drawn. By shutting down the division cocks I can tell whether or not the main is tight, or whether water is passing or not; but even this is not necessary, as with less than half the number of men requisite for working meters, we can sound every supply main-cock and hydrant with the utmost regularity. The result is that the gauges are kept perfectly steady, and we maintain the consumption below 17 gallons per head. The manager takes an average of all the gauges weekly, also of the total quantity of water pumped; and he can readily ascertain whether or not the night inspection has been going on with regularity. I find if this inspection is stopped for a week, there is the indication that we shall soon go back to where those companies were before they commenced such large outlays to enable them to make diagrams.

Let us take Mr. De Normanville's imaginary district of 600 houses (which is large for one meter). If I have stopcocks (which he says are necessary), I sound them all in three nights; and they will record every defect in exactly the same way as is done at present by the use of a sounding-rod. No. 1 section: 70 houses (no stopcocks); waste, 150 gallons per hour. Of course, these figures are given to the day inspector, who only carries on his search until he has found waste to this extent, which may be found in the first dozen houses. That is a very superficial inspection; and if the district is then to be left for six months without inspection, as suggested, I can only say that the fittings in use at Leamington are superior to any employed elsewhere. But that is assuming too much. Mr. De Normanville states that considerable time and labour are saved; but he does not give the population of his town, the number of meters he is using, their size and cost, the expense of the machines and fittings, fixing, &c., and of the extra men he has taken on with the additional pay for a superior class of workman. Nor does he state whether he adopted night inspection to detect the one leak of 56,000 gallons per hour, or whether he did anything to prevent waste prior to this expenditure. I never knew a night inspector to walk over any leak when sounding the cocks by night; and such a large leak could be heard a very long distance off.

Leamington is said to contain 30,000 inhabitants. One night inspector would sound every stopcock in about fourteen nights. By placing on the service-pipe a small piece of pipe or a rod with its end level with the top of the pavement, you have a cheap and efficient method of obtaining access to every house. Each supply sounded once in three weeks, or (say) fourteen complete rounds in the year, would be, I think, a much more "simple" and "perfect" method than that now employed; and it could be done at very little cost. At least, that is my experience.

Aug. 14, 1889. ANOTHER NIGHT INSPECTOR.

MR. F. LENNARD'S PROCESS FOR THE CONTINUOUS DISTILLATION OF TAR.

In the JOURNAL for June 11 last (p. 1067) we gave an abstract of the specification of a patent taken out by Mr. F. Lennard—of Messrs. Forbes, Abbott, and Lennard, the well-known firm of manufacturing chemists—for a process for the continuous distillation of tar. The publication of this notice of Mr. Lennard's arrangement called forth a letter (dated June 20) from Mr. J. Stoer, of the Dublin Tar Distillery Company, Limited, in which he stated that he had, ten years previously, worked an identical system on a small scale; but, for pecuniary and other reasons, he had not employed it to a large extent. He added that his small apparatus (made by Mr. J. Donfield, of Dublin), was still in existence at the works of the Company, and could be seen by anyone who wished to verify his

statements. On the appearance of this letter, Mr. Lennard wrote to Mr. Stoer stating that, before replying to the letter, he would be glad to know whether he or his representatives would be afforded facilities for seeing the model apparatus referred to, as it was most remarkable that the still in question should be identical with his own, which was the result of many varied and costly experiments extending over several years. To this Mr. Stoer replied that he should be happy to show the apparatus to Mr. Lennard; but that as he (Mr. Lennard) must have undoubtedly seen it when he visited the Company's works in 1886, he questioned whether further inspection was necessary. On receipt of this reply, Mr. Lennard at once wrote as follows:—"You really astonish me by saying that I saw at your works in 1886 an apparatus identical with that which I have just patented. The assertion is so totally inaccurate that I cannot help thinking there is some misunderstanding between us. I do not know of one single piece of plant that I saw during my visit that bears the slightest resemblance to anything that I have patented; and, for the life of me, I cannot imagine what you can possibly be referring to. Will you please be a little more specific in your assertions, and let me know what it is that you have in your place which corresponds with my still?" A few days later Mr. Stoer replied in these terms: "I certainly showed you my little stills for continuous work when you were over here with Mr. Koe in 1886. This having been done in your round of inspecting Messrs. J. Bethell's works, you may have forgotten it in the then pressure of weightier matters. The principle in mine is certainly identical with yours; and the first paragraph in the JOURNAL OF GAS LIGHTING, p. 1087, accurately describes my process. The apparatus of mine is, however, different from yours, as you will see when you come over. Of course, you will give me equal facility for inspecting your apparatus." Mr. Lennard, in his answer to this letter, said: "If, during my visit to Messrs. J. Bethell's works, you did show me your 'little stills,' I most certainly have not the faintest recollection of having seen them, and do not know to what you refer. If I had seen anything at all on the lines of my apparatus, I certainly should not have forgotten it. As you now admit that your apparatus is not the same as mine, I hope you will see the propriety of withdrawing the statement made in your letter to the JOURNAL OF GAS LIGHTING. I shall be glad to receive an intimation from you that you will take this course." In reply, Mr. Stoer said he did not see how he could withdraw his letter, to the JOURNAL; his process and that of Mr. Lennard being "quite alike." He added: "Even as far as apparatus goes, I could not say anything, because, though in your patent it seems to differ, I cannot say it does unless I see it. The process must either be quite free to tar distillers, or I must share in the advantages, as first inventor." In response to this, Mr. Lennard expressed his inability to understand why Mr. Stoer should not see his way to the withdrawal of his letter to the JOURNAL, considering that he had admitted being in error in what he stated in that letter in reference to his system being identical with Mr. Lennard's. "You evidently," he continued, "by this refer to apparatus, as you speak of it as being worked on a small scale; and again you refer to your 'small apparatus.' Now you state that, as far as apparatus goes, you can say nothing, except that that which I have shown in the specification of my patent seems to differ from yours. The process as carried on by my apparatus is certainly not open to anyone but myself to use; yours may be—I cannot say anything as to that. After the admission made in your last, I can only again require you to withdraw yours of the 20th of June. Unless you undertake to do this at once, I shall publish the whole correspondence, as I cannot allow a statement, which you yourself confess you had no ground for making, to remain uncontradicted." In a postcript Mr. Lennard added: "As you appear to have some difficulty in understanding the point, I would suggest that you consult some professional man conversant with the patent law; and I have no doubt but that he will advise you that what I have asked you to do, is the proper course to adopt." In reply, Mr. Stoer said he had no objection to the whole of the letters being published; and with this the correspondence closed.

SAN PAULO GAS COMPANY, LIMITED.—At the extraordinary general meeting of this Company, held last Tuesday, it was resolved, subject to confirmation at the meeting to be held on the 28th inst., to increase the capital by the issue [of [5000 shares of £10 each, to rank *pari passu* with the existing shares, and to be first offered to shareholders at par.

THE WATER GAS EXPLOSION AT HULL.—An inquiry has been held at Hull, by Mr. H. Birks, the Deputy-Coroner, into the circumstances connected with the death of Joseph Cade, who, as was briefly announced in the JOURNAL last week, met with his death at the Royal Agricultural Exhibition, by the explosion of a purifier at the stand of the Yorkshire Water Gas Company. The lid of the purifier, it will be remembered, was thrown some distance into the air, and in its descent struck the deceased. It appears that a "Dot" gas-engine was connected to the water gas plant; and the explosion was caused by the ignition of the gas-jet of the engine while there was in the pipes leading to the purifier an explosive compound. A considerable amount of evidence was adduced, and ultimately the jury returned the following verdict:—"We unanimously find that the deceased, Joseph Cade, met his death from misadventure, and are further of opinion that the officials of the Water Gas Company are alone to blame. We regret that more efficient persons are not employed on the plant; and further desire that some discipline in future operations should be maintained."

BROMLEY (KENT) GAS COMPANY.—The report of the Directors of this Company for the half year ending June 30 last, states that the increase in the make of gas for the six months, although fairly satisfactory, being nearly 6 per cent. over the corresponding period of last year, has not been so great as was expected as the result of the reduction of 6d. per 1000 cubic feet which took place as from the commencement of the present year. The consumption of gas appears, however, to be now more rapidly progressive; and the Directors anticipate that in the current half year the Company will be recouped to a considerable extent for the loss of revenue occasioned by the reduction. The profit and loss account shows a balance of £4691 available for division; being a net decrease of nearly £950 as compared with the corresponding half year of 1888, when the price of gas was 3s. 6d. per 1000 cubic feet. In anticipation of this deficit, the Directors, it will be remembered, recommended at the last half-yearly meeting, that the large sum of £1057 should be carried forward; and this, added to the net profits of the six months, enables them, without having recourse to the reserve fund, to recommend that the usual dividends be declared for the half year—viz., at the rate of 11 per cent. per annum on the ordinary 10 per cent. shares, and 8 per cent. per annum on the ordinary 7 per cent. shares (amounting together to £4636)—and that the balance (£56) be carried forward. The works have been recently improved by an addition to the coal-siding and a turn-table (which tend greatly to more convenient and economical working), and also by the construction of a new storeage tank for ammoniacal liquor; and the Directors have contracted for new apparatus on an improved principle for the manufacture of sulphate of ammonia, which is expected to add considerably to the profit of this part of the business.

Parliamentary Intelligence.

HOUSE OF LORDS.

THURSDAY, AUG. 15.

PRIVATE BILLS (ALTERATION OF MEMORANDUMS OF ASSOCIATION).

On the motion for the consideration of the report from the Select Committee on Private Bills dealing with the alteration of Memorandums of Association,

Lord HERSCHELL said the appointment of this Committee arose out of the proceedings in regard to the Belgrano (Buenos Ayres) Gas Company Bill, which passed the other House, but was stopped in their Lordships' House by the Chairman of Committees, who thought it desirable that the question should be considered as to how far, and under what restrictions, companies registered under the Act of 1862 should be permitted to alter their Memorandums of Association. With a view to securing uniform practice, a Committee composed of members of each House was appointed to consider the subject; and the Committee reported in favour of legislation being passed to give to the High Court power to grant leave for such alteration after full notice and opportunity had been afforded to all those whose interests might be affected to attend and show cause against such leave being given. The Committee, however, felt that it would not be right that, pending such legislation, there should be an absolute stop to all desired alterations; and they therefore suggested that such alterations should be permitted by Parliament under similar conditions to those which it was proposed to apply to the action of the Court in all cases where the alteration of the memorandum was such as to include objects cognate or ancillary to the original objects of the company, or which circumstances arising since the formation of the company rendered necessary. He thought the recommendations of the Committee might safely be adopted.

The Earl of MORLEY endorsed the view of the noble and learned lord, and expressed the hope that legislation in the direction suggested would not be long delayed.

The LORD CHANCELLOR said he could not allow it to go abroad that there was a general opinion in favour of the legislation which the report suggested. People embarked in companies whose objects were described in memorandums; and it was suggested that, under certain conditions, a company should be permitted to alter and enlarge those objects. He had not been able, as yet, to fully consider the report and the conditions which were therein suggested. Each shareholder, however, was, it appeared, to have the right of coming to the Court and objecting to the alteration. But, as experience showed, what was anybody's business was often nobody's; and it was a matter for consideration whether this and the other safeguards would be adequate. He was not expressing any adverse view to the report, but merely desired to say that he could not bind himself to accept its recommendations.

The Belgrano (Buenos Ayres) Gas Company Bill, in respect of which the question had arisen, was then read a second time.

ELECTRIC LIGHTING PROVISIONAL ORDERS BILLS.

Upon the motion for the third reading of the Electric Lighting Provisional Orders (Nos. 2, 3, 4, 5) Bills,

The Earl of CRAWFORD AND BALCARRES expressed the opinion that the meter and testing clauses would prove unworkable, and that recourse to Parliament would again be necessary.

The Bills were then read a third time, and passed.

THE PROCEEDINGS AT THE ELECTRIC LIGHTING INQUIRY.

The Earl of CRAWFORD AND BALCARRES moved that the minutes of evidence and proceedings in the inquiry on the Electric Lighting Provisional Orders for the Metropolis, held by Major Marindin, R.E., by direction of the Board of Trade, be laid before the House. He remarked that there was a great desire on the part of the large number of persons who were interested in the new branch of industry of electric lighting that copies of the evidence and proceedings in the inquiry he referred to should be obtainable by the public.

The Earl of LIMERICK regretted that he could not, on the part of the Government, assent to the motion, on the ground of the expense which the printing of the evidence would entail.

The motion was thereupon withdrawn.

The following further progress was made with Bills during the past week:—

Bill reported: Belgrano (Buenos Ayres) Gas Bill.

Bills read the third time, and passed: Metropolitan Electric Supply Bill, Wigan Borough Extension Bill.

Bills Royal Assented: Belfast Water Bill, East Kent District Water Bill, Electric Lighting Provisional Orders Bill, Newry Improvement Bill, Rastrick Water Bill, Scarborough Improvement Bill, South Kent Water Bill, West Ham Gas Bill, Woodhall Spa Company Bill.

HOUSE OF COMMONS.

FRIDAY, AUG. 16.

GOVERNMENT DEPARTMENTS (TRANSFER OF POWERS) PROVISIONAL ORDER BILL.

Mr. HOBHOUSE asked the President of the Local Government Board whether the Government Departments (Transfer of Powers) Provisional Order Bill was to be abandoned in consequence of the report of the Select Committee; if a similar Bill would be introduced next year; and, if not, how the Government proposed to carry out the undertaking they gave last year to enlarge the powers of County Councils by transferring to them certain duties of the Government Departments.

Mr. RITCHIE: The honourable gentleman will recognize that the Government have, by introducing the Bill, fulfilled the undertaking under which they came last session; and I regret that the report of the Select Committee to which the Bill was referred precludes the Bill being proceeded with this year. No enlargement of the powers of the County Councils can take place without legislation; and I cannot give any assurance as to what may be proposed next session.

Mr. HOBHOUSE gave notice that he would call attention to the subject.

THE SALFORD GAS SCANDAL.

Mr. HOWELL asked the Home Secretary whether he had received a memorial from certain persons in the borough of Salford, praying for a remission or mitigation of the sentence passed on one Samuel Hunter for forgery and perjury; whether he would state the number of signatures to such memorial, and what number of them were members of the Gas Committee, in connection with which frauds were discovered; whether he had given any reply to the memorial, and, if so, what was its nature; and whether, before giving any reply, he would consent to lay upon the table of the House a copy of the memorial, together with the names and descriptions of the persons who signed it.

Mr. STUART-WORTLEY: Yes, Sir. Such a memorial was received on the

13th inst. It is signed by 26 persons, among them being the Chairman of the Gas Committee, the Mayor of Salford, and several aldermen and councillors. No reply has yet been sent to the memorial. It would be contrary to all precedent to lay a memorial in a criminal case on the table of the House.

Mr. HOWELL gave notice that if the Home Secretary acceded to the prayer of the memorial, he would call attention to the whole question, and move that a Select Committee be appointed to inquire into the matter.

During the past week, the Barry and Cadoxton Gas and Water Bill was read the third time, and passed.

Miscellaneous News.

SOUTH METROPOLITAN GAS COMPANY.

The Ordinary Half-Yearly General Meeting of this Company was held at the Bridge House Hotel, London Bridge, last Wednesday—Mr. GEORGE LIVESEY in the chair.

The SECRETARY (Mr. Frank Bush) read the notice convening the meeting, and the minutes of the last meeting.

The CHAIRMAN: Ladies and gentlemen, I assume that, in accordance with the usual practice, you will take the report and accounts as read.* Copies have been sent to all the proprietors. I have no doubt that those who are sufficiently interested in the Company to read them have made themselves acquainted with their contents. We present you on this occasion with a short report, simply because there is very little to say. The first paragraph tells you of the continued progress and prosperity of the Company. It is perfectly true that the increase of business has not been at so great a rate as last year; but as I have said on previous occasions at these meetings, that is very much dependent on the weather. Now, last year during the summer months we had very cold wet weather; and there was a very large increase of gas consumed during that period. This year the weather has been fine; and we have not had so large an increase in the later months of the half year. But, I am happy to tell you, we have topped the high record of last year during the whole of those months, which, I think, is very satisfactory, considering that in the summer months of last year our increase ranged from 10 to 20 per cent. The most important thing in the report is the statement of the reduction of price. We feel it is essential to the maintenance of our position that we should sell gas at the lowest possible price; and we wish to make the consumers feel what is actually the fact, that they and the shareholders are really partners in the business. Whenever, therefore, we have the opportunity, and we feel justified in making a reduction, we make it—that is, when we consider the reduction can be maintained. Now a reduction of 2d. per 1000 cubic feet is a serious matter. It means nearly £25,000, in the half year, or about £50,000 in the year. We did not make a surplus profit last year sufficient to warrant this great reduction; but we anticipated the abolition of the coal dues on the 5th of July. We certainly expected that these dues would have been entirely abolished. However, that is not the case; but their abolition is rendered certain on July 5 of next year. The 1s. 1d. per ton which used to be charged is reduced to 4d. per ton, which is continued to the City Corporation for one year, in order to enable them to pay off some bonds incurred in constructing the Holborn Viaduct. This simply means that the consumers of gas in the south of London will have to pay £10,000 in the next twelve months to the City of London for the Holborn Viaduct. Then there will be an end of the dues. However, the reduction from 1s. 1d. to 4d. helps us very materially. It will save us £10,000 in the coming half year, or £20,000 a year. The increase of business I have already touched upon; but I do wish to say, in regard to this large reduction in the price of gas, that we feel justified in making it, because we think that, if we wish to maintain our hold upon the consumers, and to increase the business, this is a sure and certain way of accomplishing it. Another item in the report is of interest—it is the last but one. It says: "The exhibitions of gas-stoves and other apparatus, in conjunction with illustrated cookery lectures—begun last year—have been repeated with great success during the last three months." In fact, the success of these cookery lectures has astonished us. Wherever we could find a public hall—whether in a poor neighbourhood or a rich one—we hired it for four days, and gave two lectures a day in it, appointing some competent lecturer from the school of cookery, and illustrating the lectures that have been given in the afternoon and evening. They have been well attended; with this singular result—we have done best in the poor districts where we least expected it. And I may say that, in one of the poorest residential districts, 25 per cent. of our consumers have cooking-stoves. When, however, we get to the better districts, the ladies do not care to come to the lectures—they send their cooks. They take advantage of the lectures; but they still have a prejudice against the use of gas for cooking. We shall, however, break this down; and, as it is, a great many stoves are used in the better neighbourhoods. When it is found that gas cooking is superior to any other system of cooking, I have no doubt we shall overcome the prejudice that still exists against it. Meanwhile, the result has been an enormous increase in gas cooking-stoves; and if you will refer to the capital account, you will find we have spent a very large amount of money on additional stoves. Whereas in the June half of 1888, the amount spent was £6800, in the June half of 1889, the expenditure was £10,121. This is a large addition to the capital account; and I may tell you that more than this has been spent on stoves, because if you refer to the revenue account, you will find we have spent on repairs and renewals of stoves £1700, a large proportion of which has been expended in the purchase of new stoves in place of old ones worn out. This, I think, is a very satisfactory item in connection with our business. As to the accounts generally, there is very little I have to say about them. Comparing them with those of last year, the report informs you what is the reduction of the rental; it tells you that the reduction would have been very nearly £25,000, but that it has only been £13,494, owing to an increase of 3¼ per cent. in our business. With respect to coke, in the June half of last year the receipt per ton of coal was 5s. 5d.; this year, it was nearly 5s. 7d. Tar last year brought us 6¼d. per ton; this year it has realized 1s. 1d. I may tell you that it would have been more than 1s. 1d. if all the tar we made had been sold; but a considerable proportion, in the beginning of the half year, was burnt under the retorts. However, as the market value increased, we ceased to burn our tar, and are now selling it all—or practically all. For ammonia, the receipts per ton of coal are just about the same—1s. 5½d. last year, and 1s. 5½d. this year. Altogether the total receipts per ton of coal which we derived from products in 1888 were 7s. 6d.; and in the past half year the amount was 8s. 2d. This has, of course, helped us to wipe off the deficiency in the gas revenue. Well, now, there is a matter which I suppose I must speak about; I expect the shareholders would not be satisfied if I did not. I refer to the action of The Gaslight and Coke Company against this Company, in relation to the supply of gas at Nine Elms; and here I must ask your patience for a little while, because it is necessary for me to go back some years. Prior to 1853 there was general competition among the Gas Companies. In the South of London, there were four Companies; and those Companies, in many cases, had each two mains in a single street. Prior to 1853, there was free competition among the Gas Companies; and the consumers all had the opportunity of taking advantage of this competition, and obtaining a supply of gas from which Company they pleased—from the Company that served them best, or which they fancied most. In 1853 the Companies—acting on the maxim of Stephenson, the Railway Engineer, that, where combination is possible, competition is impossible—agreed to divide the districts between them as a private arrangement. They did so; and the South of London was districted in that year. The following year the Companies applied to Parliament for parliamentary sanction to this districting. They were opposed by the authorities, who objected to the monopoly; and the Bill was thrown out. In 1858 or 1859, the Companies in the north districted; and then the public authorities felt that the monopoly which the Companies had established amongst themselves was so intolerable that a strong agitation was got up, and Parliament was moved to pass the Act of 1860, at the instance of the local authorities—not for the purpose of creating a monopoly (that monopoly having been already created by the independent action of the Companies), but for the purpose of regulating the monopoly, and preventing it from being oppressive to the consumer, and, as a complement to the monopoly, to make the supply of gas compulsory, providing that any Company having gas-mains in a district should be compelled to supply gas to any consumer whose premises were situated within 50 yards of the mains. In 1871 this was made still more emphatic. In the Gas-Works Clauses (Amendment) Act, 1871, it is enacted—because now competition is done away with all over the kingdom—that "the undertaker shall upon being required so to do by the owner or occupier of any premises situated within 25 yards from any mains of the undertakers, or such other distance as may be prescribed, give, and continue to give, a supply of gas for such premises." Now, what was the practice? The practice from 1853 right up to the present time has always been this—that the Companies did not interfere with the individual rights of consumers to get a supply of gas from any Company to whose district they had access; and if the consumer happened to have his premises situated in two districts, he took his gas from that Company which he liked best. This has been the universal practice. An attempt was made in 1868 to put an end to this in regard to the Great Western Railway Company, who took gas from a Company at Wormwood Scrubbs. But Lord Cairns then decided that the Great Western Railway Company were perfectly in their right in taking their gas from Wormwood Scrubbs, bringing it to Paddington, and using it there, because, he said, at the meter the risk of the Gas Company ends, and the risk of the consumer begins. The gas is purchased by the consumer; and when it comes into his possession, he may do what he likes with it. Now, a notable case in the South of London was Mr. Tarn's shop. The Phœnix and the South Metropolitan districts joined at the Elephant and Castle. Mr. Tarn's shop has a frontage in the New Kent Road, which was in the South Metropolitan Company's district; and a frontage in Newington Causeway, which was in the Phœnix Company's district. The South Metropolitan Company were selling gas at a rather lower price than the Phœnix Company; and Mr. Tarn came to us for an increased supply. We gave the increased supply; and then the Phœnix Company went to him, and said: "We will supply you at the same price." He decided to take gas from them too. His pipes were connected; the premises joined; and he took gas, and used it where he pleased, from which Company suited him best—both Companies feeling that he had a perfect right so to do. Well, that was the state of things when the South-Western Railway Company applied to us to increase the supply for certain works of theirs at Nine Elms. We were already supplying the greater part of their premises at Nine Elms, but The Gaslight and Coke Company supplied the back part of certain premises which abutted on their gas-works at Nine Elms; and they supplied them, not from the public street, but by a subway under the boundary separating their premises from those of the Railway Company. We gave a discount to Railway Companies of 5 per cent. It is more than 20 years since we began to give it. The Railway Company applied to The Gaslight and Coke Company for the discount, and were refused. Then they appealed to us for a supply of gas sufficient for the whole of the premises. I may say, taking this room as an illustration of their premises, that the front part of them, say as far as this table, is in the South Metropolitan Company's district, and the back part is in The Gaslight Company's district. The boundary line goes through the premises, which at the time the line was drawn were open fields. The Railway Company said to us: "Give us an additional supply of gas in the front, that we may take it all over our premises." We consented. We could not, under the state of the law at that time, refuse to do so. It had been the universal practice of gas companies to do so. They had never thought of contesting the right of consumers to demand this supply. They had always given it. I was only yesterday told that The Gaslight and Coke Company are doing it now in the case of the East London Water-Works Company at Lea Bridge. The demand was made upon us; and we gave the increased supply. Then The Gaslight and Coke Company entered an action against us, and applied to the Courts for an injunction to restrain us from supplying gas in their district. We had the front door—and the Lord Chancellor clearly stated that the Districting Act of 1860 says the entire premises go with the front door—they had the back wall. We did what we felt was right; and we could do no other than defend the action. The Courts had hitherto always taken that view; but last week the House of Lords decided against us. It is really a small matter. The profit derived from the supply of gas to that part of the South-Western Railway Company's premises is a matter of not the slightest moment either to this Company or to The Gaslight and Coke Company. The loss of it to us, or the gain of it to The Gaslight and Coke Company, will not make an atom of difference. The annual consumption of gas there is only six weeks' ordinary increase of business in our case; and about a fortnight's ordinary increase of business in theirs. My own feeling is that the noble Lords did not understand the matter, and that their decision is wrong, and against the interest of the consumer. Moreover, they shirk the question of the right of the consumer to do what he likes with the gas as soon as it has passed through his meter, to carry it to any part of his property, though it may be without the Gas Company's limits. Lord Herschell, in his judgment, said: "I do not stop to inquire whether that is the case—I am by no means sure that that could be done; . . . but whether that be so or not, that is not the case with which we have to deal here." With all deference to his Lordship, I must say that was the essence of the case; but they decided against us, and we shall try our best to comply with their decision. The loss or gain of this business is nothing—the loss or gain of the action is nothing; but the worst of it is the manifestation it affords of the want of cordiality between the two Companies. I do feel that the gas interest

* The Directors report was given in the JOURNAL for the 6th inst., p. 262; and the accounts in last week's issue, pp. 316, 317.

is one that is attacked on all sides. We have comparatively few friends; and we have a great many people who will give us a kick if they can. I do feel in the gas interest that it is essential that we should all pull together; that we should all work cordially together; and if, as the result of this action, it should bring about a cordiality of feeling between the Chartered Company and ourselves—just as the result of the war between Prussia and Austria brought about cordiality between these two countries—I should say that I am glad of it, because I feel that all personal considerations should be set aside. In face of the difficulties that are in front of the gas interest, we ought really to work and pull together. There are many points in which the advantage of cordial action might be very apparent. For instance, there is the question of the testing of gas. The London County Council want to get an alteration of the testing arrangements; and one part of what they wish is most unfair. If the two or three London Companies can work and act together, I have no doubt we shall have what is satisfactory and just all round; but if one is pulling one way, and the others another, and if we cannot meet and work together, I do not think the result will be so satisfactory as it might and ought to be. Then there is the question of the workmen. I am not going to say much on the matter, but I do say that the question of dealing with the stokers, and the settlement arrived at, would have been more satisfactory had we all pulled together, than by working independently. And I say that, on these grounds and many others, it is essential for the well-being of the gas companies that we should work cordially with each other. Not that I am afraid of our industry. A great many people find fault with gas; but they are very glad to use it. Gas holds its present position by its inherent advantages and its inherent qualities. It is an absolute necessity of civilization; and if we—the gas companies—do our duty by the public, and supply them with the best article in our power at the lowest possible rate, there is not the slightest fear of any injury to your property from anything that is in the field at present. What else may arise, we do not know; but no doubt we shall be able to meet it when it comes. Your dividends are perfectly safe. I expect next half year there will be a deficiency. Coal and iron have both risen in price. We are paying much higher wages, which will tend to reduce our profits. But if next half year you receive an account which shows that we have not earned the dividend, do not be at all alarmed. Do not let any one frighten you into the idea of parting with your stock. We have ample reserves to meet any deficiency. The reserve fund is solely for that purpose! and when coal and iron advance in an unexpected manner, the reserve fund we have accumulated is to be used for meeting a case of that sort. The improvement of trade is not altogether an advantage to gas companies; it is an indirect advantage, no doubt. But it always results in higher prices for coal and freight, and all materials that gas companies use; and these increased charges more than neutralize or counterbalance the advantage we derive from the increase in our business. If people are prosperous, it benefits the railway companies, for they say they will have a holiday; but they do not say: "We will burn more gas." People do not burn more gas because they are more prosperous, but in order to supply their needs; and whether they are prosperous or not, those needs must be supplied. That being so, I look forward with great hope and confidence to the future of gas; and especially do I look forward with confidence to the future of this Company. I move—"That the report and accounts now presented be received and adopted; and the report entered on the minutes."

Captain T. B. HEATHORN, R.A.: I have great pleasure in seconding the resolution proposed by the Chairman. In the difficult case recently decided against us, we must bow to the law, and pray for light; and I have no doubt it will all come right.

Mr. MASE thought that the law expenses which they would have to pay in connection with the action with The Gaslight and Coke Company would be a serious matter.

The CHAIRMAN: We shall have to pay the law expenses—taxed costs; but that is not a really serious matter. The amount will not be felt by the shareholders at all.

The resolution was carried unanimously.

The DEPUTY-CHAIRMAN (Mr. John Mews): The next resolution is one that is always pleasing to us to submit to you. It is the resolution relating to the dividend, and is as follows:—"That a dividend at the rate of 13½ per cent. per annum be now declared, and that such dividend, with the exception of the sum of £93 15s., be apportioned amongst the three classes of stock, as prescribed by the Scheme of Amalgamation, 1880, and that the warrants be transmitted to the registered addresses of the proprietors by post."

Mr. R. O. WHITE seconded the motion, which was carried unanimously.

Mr. R. HESKETH JONES, J.P., proposed a vote of thanks to the Chairman and Directors.

Mr. MASE seconded the resolution, which was carried unanimously.

The CHAIRMAN: On behalf of my colleagues and myself, I can assure you that we appreciate very highly this renewed expression of your confidence in us, and your kind feelings towards us. I can assure you that we have the welfare of the Company at heart, and that anything and everything we can do will be done to promote its prosperity. We intend in the future, as in the past, to consider first and foremost what is for the good of the Company, and to the best of our ability do it. There is one matter that I think I ought not to pass over, because, while you have thanked the Directors, there is something due to the officers. I can assure you that the position of the principal officers in a gas company is not a sinecure. There are many difficulties which they have to meet; and very much depends on the tact, temper, and judgment with which they deal with the difficulties that come before them in addition to the ordinary routine of carrying on the business, and endeavouring to push it among those who do not use gas. I am happy to inform you that your officers perform all those duties to the entire satisfaction of the Directors. They do endeavour to push the business, and do put their hearts into the work. When I say "officers," I do not only mean the chief officers. I have to include in this vote all the officers of the Company, because I can make no exception. I believe that a very good spirit animates them all, and that they deserve the thanks of the shareholders. I have very great pleasure, therefore, in proposing that the thanks of this meeting be given to the Engineer and those under him, and to the Secretary and those under him, for their attention to their duties.

Mr. MASE seconded the motion, which was agreed to.

The CHIEF ENGINEER (Mr. Frank Livesey): I thank you very heartily for myself and all those, so far as regards the engineering department, who are included in the vote which has been passed. I can assure you that we are all endeavouring to do our best to serve the Company. There is one matter I should like to mention to you about the increase in our business. The accounts of this half year compare with those for a year which was leap year, so that we lose a day in these accounts; and that day would, I think, very nearly bring us up to our normal increase.

The SECRETARY: I thank you all very cordially for the vote that you have passed. I see a number of my brother officers before me; and it will gratify them, as much as myself, to know that what we have done has met with the approbation of the shareholders and the Directors.

PROVINCIAL GAS AND WATER COMPANIES.

The following are summaries of the Directors' statements and the reports of the proceedings at meetings of the several Gas and Water Companies mentioned which have been received during the past week.

The report presented by the Directors of the Scarborough Gas Company, at the half-yearly general meeting of the shareholders on the 10th inst., showed that there was a sum of £5639 available for division. Out of this the Directors recommended, after providing the interest on the preference stock, the payment of the maximum dividends on all the other stocks of the Company. This would absorb £5036, and leave a balance of £603 to be carried forward. It was stated that, considering the mild weather which prevailed during the past winter, there had been a fair increase in the consumption of gas, which, together with the additional return derived from residual products, has materially aided revenue against the effect of the recent reduction in price. The new contracts for coal had, however, been entered into at a considerable advance upon last year's prices. The Chairman (Mr. Alderman Fowler), in moving the adoption of the report, stated that the expenditure on revenue account had been £8641, an increase of £630, as compared with the corresponding half year of 1888, and the receipts £13,682, a decrease of £349; and these sums, amounting to £979, accounted for the reduction in the balance carried forward to profit and loss. The reduction in the receipts was due entirely to the lower price charged for gas, as, whilst they had sold 1,360,200 cubic feet more gas to private consumers, they had received £635 less for it; and, had it not been for the increased prices obtained for residuals, the deficiency would have been greater. The increase in the expenditure was owing chiefly to the extra cost of repairs and maintenance charges, and the additional cost of coal. He concluded by testifying to the unwearied exertions of the Secretary and Manager (Mr. W. J. Moon) in the interests of the Company; adding that he was sure the *employés* all did their utmost to promote its welfare. Mr. R. H. Butterworth seconded the motion. Mr. Talbot expressed dissatisfaction with the report and with the position of the Company. He asked how the increased expenses were to be met, and the dividend paid, if the price of gas was kept at its present figure. He was an advocate for selling gas at a low price; but he was also an advocate for having the usual dividend. If they received this, he did not care how they sold their gas. The Chairman observed that they had a reserve fund of £13,000 on which they could draw in times of adversity. He, however, had no fear of the dividends. The Manager explained that the Company had given to the consumers upwards of £900 in the shape of a reduction in price, which was the chief cause of the reduced income; but it was being steadily overcome. There had been a fair increase in the consumption; and it was on this increase that the Directors depended when they lowered the price. The motion was carried, and the dividends recommended were declared; the proceedings closing with a vote of thanks to the Chairman, Directors, and Manager for their services.

The half-yearly general meeting of the Preston Gas Company was held on Monday last week—Colonel Mounsey in the chair. The usual dividends of 10 per cent. on the "A," and 7 per cent. on the "B" stock were declared; and at a special meeting afterwards held, the Directors received authority from the shareholders to issue from time to time the remainder of the £120,000 of capital authorized by the Act of 1879.

The annual meeting of the Northampton Gas Company was held last Thursday, when the Directors submitted a report which showed that the results of the operations during the twelve months ending June 30 was a balance of £8272 to the credit of the profit and loss account, out of which they recommend that the maximum dividends be paid on the several classes of shares. It was stated that additional capital had been raised for the ensuing year to the nominal amount of £4000, by the issue of 200 new ordinary shares, which realized on sale by auction the sum of £5526, and further capital was requisite to provide for bringing to a completion the extensions at the works now in course of progress. Owing principally to the increased rates for carriage now charged by the railway companies, the cost of coal had recently advanced about 2s. per ton, which made a considerable difference to the Company upon the consumption for the ensuing year. On the other hand, more favourable terms had been obtained for residuals, which, it was hoped, would enable the Directors to continue the present low price of gas—at any rate for another year. The demand for gas, it was reported, was still increasing; and the Directors had every confidence that it would continue to do so, and thus justify the additions and improvements which they had undertaken at the works. The report was adopted; and the meeting was afterwards made special, when a resolution was passed, enabling the Directors to raise further capital to the amount of £20,000 by the creation and issue of new shares.

The accounts of the Brighton and Hove Gas Company for the six months ending June 30 last have been issued by the Secretary (Mr. W. H. Hardy), in view of the half-yearly general meeting of shareholders to be held on the 6th prox. Unfortunately, they show a decrease in the amount of rental as compared with the corresponding period of last year. This, the Directors explain in their report, is caused by the reduction of 2d. per 1000 cubic feet in the price of gas which came into operation on the 1st of January last, and by a slight decrease in the quantity of gas sold. There is, however, a small increase in the value of residuals. Notwithstanding the general advance in the cost of coals and in the rate of wages, the Directors hope to be able to make a further reduction in the price of gas at the commencement of the new year. They recommend dividends at the rates of 11 per cent. per annum on the original shares, 8 per cent. per annum on the "A" shares, and 6 per cent. per annum on the "B" preference shares, all less income-tax.

The Directors of the Bath Gaslight and Coke Company have issued a very brief report to the shareholders on the working of the past half year. They say: "Although the gas-rental shows a decrease, caused chiefly by the mild weather during the winter months, when gas was not required so much as usual for heating purposes, it is pleasing to announce a satisfactory increase in the residual account when compared with the corresponding period of the year 1888. The Directors recommend the declaration of maximum dividends." Ample information, however, is afforded by the accounts annexed to this statement. From the revenue account we learn that the sum received for gas was £23,986; and for residual products, £4848. The total income was £29,452; and the outlay amounted to £21,233—leaving a balance of £8218. The amount of net profit to be carried to the next account, subject to the past half-year's dividends, is £9963.

The statement which the Directors presented to the shareholders of the Newport (Mon.) Gas Company, at their ordinary meeting yesterday week, showed that the concern was in a better position at the close of the past half year than it has been since 1885. In respect to the capital account, the sum of £13,500 borrowed on mortgage bonds has been paid off; and in accordance with the resolution of the shareholders, the same has been issued to the proprietors as debenture stock. It will be necessary, the Board point out, before the close of the present year, to raise additional capital by the public sale of C shares authorized by the Act of 1886. The financial result of the working during the six months, was a balance of £4529 to be carried to the profit and loss account. In moving

the adoption of the report, the Chairman (Mr. E. J. Phillips) said that in 1885, they reduced the price of gas 2d. per 1000 cubic feet; and from that time up to the present half year, they had been unable to pay the dividends out of the net earnings. This half year, however, they had some £500 more than in the corresponding half of 1888, and this was almost entirely owing to the increased value of residual products. With regard to capital, it was expected that before the close of the next winter, they would have to extend their works to Crindau. This would cost about £2000; and to meet the expenditure, they would have to offer some "C" stock for sale. Altogether, however, it would be necessary to raise some £5000 or £6000 for the projected Crindau works. Before concluding, he acknowledged that the Directors were very much indebted to the officers of the Company for the assistance they had given them in bringing about the satisfactory results laid before the proprietors. The report was adopted; and dividends of 5 per cent., 3¾ per cent., and 3½ per cent. for the half year were declared on the various classes of stocks and shares.

At the half-yearly meeting of the Peterborough Gas Company last Tuesday, the maximum dividend was declared. It was decided to carry forward £247; the Chairman remarking that they should require it, for they would have to pay more for the same amount of coal as they carbonized last year. As to the electric light, the Chairman said the suggestions made that it should be introduced at Peterborough need cause no alarm.

The Directors of the Hartlepool Gas and Water Company will, at the forthcoming meeting, recommend a dividend on all classes of stock at the rate of 7 per cent. per annum for the past half year.

In proposing the adoption of the Directors' half-yearly statement at the meeting of the proprietors of the Weymouth Gas Consumers' Company last Thursday (which document was noticed in the JOURNAL last week, p. 318), the Chairman (Mr. R. Thomas) made reference to the progress of the concern. The computation that gas companies generally should double their production in ten years has unfortunately not been the experience of this Company. When they first commenced, in 1868, said the Chairman, the production was 28 million cubic feet in round numbers; but for the past half year it was only, roughly speaking, 45 millions. Weymouth, however, had not taken those rapid strides which some other towns had. As to the price of gas, they would remember when the Company was formed, the charge to the consumer was 5s. per 1000 cubic feet. The Company only took power under their Act to charge 4s. 6d.; but they had made two reductions that effected a saving of no less than £1500 to the consumers per annum, and which, he thought, was a far larger amount than they were generally aware of. The report was adopted. A vote of thanks having been passed to the Directors, the Chairman spoke a few words of praise regarding the management of Mr. J. Lowe. He said he believed it was to his energy, perseverance, and ability they owed the success which now attended the Company. Although for the last ten years they had scarcely made any advance in the consumption of gas, yet it was through the economical management and supervision of Mr. Lowe that they had been enabled to hold their position; and, therefore, he (Mr. Thomas) took it for granted they would give him an unanimous vote of thanks for his conduct. This was heartily accorded.

The report of the Directors of the Dover Gas Company for the half year ending June 30 last, which will be presented to the proprietors at their meeting on the 2nd prox., states that the circumstances which produced a diminution in the consumption of gas during the latter part of 1888, continued to affect the sales during the first quarter of the present year. The supply has since returned to its usual rate of increase. The advance which has been experienced in the cost of coals and freights has been more than covered by the increased value of coke and tar. There has been a considerable addition to the number of gas stoves and fires in use. This the Directors regard as very favourable; and they are doing their utmost to encourage it. By the united action of the Town Council and the Company, a great improvement has recently taken place in the public lighting of a portion of the borough; and the Directors hope this may ere long be considerably extended. Notwithstanding the very low price at which the Company are now supplying gas, the profits for the half year are sufficient to pay the full parliamentary dividend, with the exception of the trifling sum of £21, which can be met by the surplus profits. The Directors accordingly recommend the usual dividend at the rate of 7½ per cent. per annum, less income-tax.

At the half-yearly general meeting of the Harrogate Gas Company to be held on the 30th inst., the Directors will recommend the payment of the following dividends: 7½ per cent. on the "A" stock; 5¾ per cent. on the "B" stock; and 5¼ per cent. on the "C" stock. They state that they have every confidence, judging by the result of the half-year's working, that the profits of the year will enable them to pay the increased rate of dividends provided by the sliding-scale clauses of their Provisional Order of 1880, and following the reduction of 3d. per 1000 cubic feet made in April last.

In moving the adoption of the report and accounts at the half-yearly meeting of the Ascot District Gas Company yesterday week, the Chairman (Mr. R. Berridge, Assoc. M. Inst. C.E.) stated that the accounts showed a profit of £504, which, added to the balance from the last account of £684, and after providing for every charge against the half-year's working, gave an amount to the credit of profit and loss of £1188, out of which the Directors recommended a dividend of 2 per cent. per annum, less income-tax. The Directors, he went on to remark, regretted to report the death of Mr. Arthur Clarke, who had been a very valuable colleague, and was one of their very earliest Directors. The business of the Company was proceeding most satisfactorily; the works and plant were in very good order; and they were more than maintaining their position—in fact, they were advancing, he might almost say with great strides. He regretted that they were about to lose their Manager, Mr. J. Gandon, who had resigned his position with the Company for a very much better one with the Ottoman Gas Company at Smyrna. At the same time, he was glad to state that they had secured in Mr. Gandon's place a gentleman who had been very highly recommended to them—Mr. Hicks, of Ramsgate, in whom the Directors had every confidence that they would have a good Manager. Mr. Alfred Williams seconded the motion, which was adopted.

The Directors of the Woking Water and Gas Company in their report for the half year ended June 30 last, recommend an interim dividend at a rate of 3½ per cent. per annum.

The accounts of the Poole Gas Company for the past half year show a profit of £884, out of which a dividend of 6 per cent. on the "A" stock, and of 4 per cent. on the "B" stock has been declared.

The Directors of the Morecambe Gas Company report a steady increase in the sale of gas to private consumers during the year ending June. This increase, they say, justified them in making a reduction of 4d. in the price of gas from January last. For cooking and heating purposes the increase is also considerable; but the consumption for public lighting continues small—in fact, somewhat smaller than in the previous year. The profit on the working of the year, after the payment of mortgage interest, income-tax, &c., amounts to £1447. To this has to be added the balance from last year of £553; making an available balance of £2000. Out of this an interim dividend of 3½ per cent. was paid on March 1; and the Directors now recommend the payment of a further 4½ per cent.—making a dividend of 8 per cent. for the year (free of income-tax). This will absorb about £1361, and leave a balance to be carried forward of £638. During the year a further expenditure of £710 has been charged to capital account. In order adequately to meet the wants of the growing district on the west of the town, it has been necessary to replace the old mains by pipes of a much greater size. Last year a large sum was expended on the erection and fittings of a new retort-house; and it has been arranged in the coming year to complete [this improvement] by erecting a new meter-house with station-meter, exhausters, and engines.

From the report of the Directors of the Yeadon and Guiseley Gas Company, which was presented at the half-yearly meeting last Wednesday, it appears that the receipts for the six months amounted to £3540 (including £2820 from gas and meter rents, and £708 from the sale of residuals); and the expenditure to £2338—leaving a balance of £1202. The report was adopted; and in accordance with the recommendation of the Directors, the maximum dividend of 10 per cent. on the consolidated stock (£11,725), and of 7 per cent. on the new shares (£17,600), was declared. It was decided to increase the price of gas 2½d. per 1000 cubic feet, in consequence of the advance in the price of coal, such increase to take place from Jan. 1 next.

In the course of his remarks at the half-yearly meeting of the Ossett Gas Company last Thursday, the Chairman (Mr. W. Statter) said that the make of gas during the six months had been 27,696,000 cubic feet—a decrease of 249,000 feet as compared with the corresponding period of last year; but the sale of gas showed an increase of about 250,000 feet—the difference being accounted for by a reduction of the leakage from 13 to 12 per cent. The balance to profit and loss account was £1783, of which £1275 would be required for dividends; leaving £508 to be carried forward. Since the last meeting, the remainder of the "B" shares had, he said, been issued (1300); and important extensions were being carried out at the works. A third gasholder was being put in, which would cost at least £9000. Probably the greater part of the new share capital would be called up during the next twelve months. The accounts were passed; and the usual dividends of 10 and 7 per cent. were declared.

At the half-yearly meeting of the Brompton, Gillingham, and Chatham Water Company last Wednesday, under the presidency of Mr. J. Baird, it was reported that, owing to the extra supply of water required by the Government establishments, the receipts showed an increase of £314 over those for the corresponding period of last year; the profits amounting to £1639 6s. 4d. The total income for the six months was £7979 6s. 2d. The usual dividend at the rate of 10 per cent. per annum, free of income-tax, was declared upon all fully-paid shares, and also upon the deposit on the new shares. It was resolved, in pursuance of a resolution dated March 24, 1884, to declare a further payment, estimated to absorb £2832 6s. 8d., on account of arrears of dividend during the two years from Jan. 1, 1878, to Dec. 31, 1879. This sum will clear the deficiencies which occurred in these two years. In consequence of the increasing requirements of the War Department and other Government establishments at Old Brompton, it was decided to extend the large duplicate main.

During the past half year, the receipts of the Dorking Water Company amounted to £980, and the expenditure to £298—leaving a profit of £682. Deducting from this amount the interest on the Company's mortgages, there remained a net profit of £597; adding the balance brought forward from the previous account, the sum available for dividend was £628. At the meeting of the shareholders yesterday week, the Directors' report, which contained these particulars, was adopted; and an interim dividend of 5 per cent. was declared.

The shareholders of the Yeadon Water Company held their half-yearly meeting last Wednesday. The revenue account showed that for the six months ended June 30, the receipts had been £735 (including £546 from water-rents, and £143 from water supplied by meter), and the expenditure amounted to £264, leaving a balance of £471. The accounts were passed; and a dividend of 5 per cent. declared. The Directors were instructed to create and issue stock for the purpose of raising the additional capital or sum of £28,000 authorized to be raised by the Company's Act of 1889, or some part thereof.

The results of the trading during the past six months permitted the shareholders of the Camborne Water Company, at their half-yearly meeting last Friday week, to declare a dividend at the rate of 8 per cent. per annum. A special meeting was held at the same time for the purpose of considering the advisability of completing one of the Company's reservoirs, known as No. 3, and also as to how the necessary funds for the payment of this and of other extensions might best be raised. It was proposed at first that the money should be taken out of revenue, but after some discussion, an amendment was carried, authorizing application to be made for a Provisional Order, giving power to the Directors to issue sufficient additional shares to raise the necessary funds.

STOCKTON AND MIDDLESBROUGH WATER BOARD.—At the meeting of this Board yesterday week, complaints as to insufficient supply of water were under consideration; and in the course of the discussion, it was stated that the Kirkleatham Local Board had requested the Local Government Board to send down an Inspector to inquire into the matter. The General Manager (Mr. D. D. Wilson) said there was at present a good supply of water; and he opined that, when the new main was made through Coatham, no one could have any ground for complaint of this kind. It may here be mentioned that the ceremony of cutting the first sod of the Blackton reservoir has been fixed for the 9th prox.

EXTENSION OF THE ABYSSINIAN TUBE-WELL SYSTEM AT SWANSEA.—The Corporation of Swansea are adopting Messrs. Le Grand and Sutcliff's Abyssinian Tube-Well system upon a very extensive scale, in order to meet the deficiency caused by the reservoirs giving out, and to procure a permanent supply of water. During the water famine of 1887, the Corporation had ten 3-inch wells put down, which have proved invaluable ever since; but now 48 additional tube-wells are being driven, and are nearly completed, from which a supply of about a million gallons of water per day will be obtained. They are connected to two receivers or mains, each about 600 feet long; and from these the supply is drawn by two pumping-engines.

THE CARDIFF WATER-WORKS AND COMMONERS' RIGHTS.—Meetings of persons entitled to commonable or other rights over the common in the hamlet of Glyn and the common of Modrydd (convened by the Town Clerk of Cardiff, Mr. J. J. Wheatley) were held last Tuesday. These commons adjoin each other; and they both comprise the land upon which the Corporation water-works are built. At each meeting, a resolution was passed appointing a Committee of persons entitled to commonable or other rights over the commons named, under the provisions of the Lands Clauses Consolidation Act, 1845, "for the purpose of treating with the Mayor, aldermen, and burgesses of the county and borough of Cardiff, as promoters of the water-works undertaking of the Corporation under the Cardiff Corporation Act, 1884, for the compensation to be paid for the extinction of such commonable or other rights, with all necessary or proper powers."

CROYDON COMMERCIAL GAS COMPANY.

The Directors' Half-Yearly Report.

In the report to be presented to the shareholders of the above Company at their half-yearly general meeting to-morrow, the Directors state that the quantity of gas sold in the six months ending June 30 last, as compared with the sale in the corresponding period of 1888, showed an increase of 8,436,100 cubic feet, or 4·63 per cent. Coke was disposed of at a slightly reduced price; but breeze and tar fetched more—the figure for sulphate of ammonia remaining stationary. Reference is made to the exhibition of gas appliances held by the Company a short time ago in the Public Hall, Croydon, and to the satisfactory results which ensued. During the period of the exhibition, applications were received for about 80 additional cooking-stoves and other kinds of gas apparatus, in addition to numerous orders given to the exhibitors. Two important resolutions will be submitted to the meeting in regard to the constitution and remuneration of the Board. The first provides that, as vacancies occur, they shall not be filled up until the number of the Directors is reduced to six; and the second is as follows:—"That in lieu of the payment to the Directors of £1300 per annum, and of £100 extra per annum for every 1 per cent. paid in dividends above rates of £10 and £7 per cent. (which would entitle the Board to receive at the present time £1700 per annum), the Directors' remuneration be fixed, as from July 1, 1889, at £1600 per annum so long as the number of Directors is eight, and be reduced by £200 in respect of each vacancy not filled up." The unappropriated balance amounts to £17,990 out of which the Directors recommend the payment of the standard dividends at the rate of 10 per cent. per annum on the capital of £51,600, and 7 per cent. per annum on the capital of £137,500; with an additional revenue dividend (under the sliding scale) at the rate of 4 per cent. per annum on the several classes of shares—all less income-tax. These dividends amount to £11,174, and will leave £6816 to be carried to the credit of the next half-year's accounts. The quantity of coal and cannel carbonized in the half year was 19,072 tons; the gas made being 198,817,000 cubic feet. The residuals produced were: Coke, 228,864 cwt.; breeze, 34,879 cwt.; tar, 198,898 gallons; and ammoniacal liquor, 449,639 gallons, from which 161 tons of sulphate of ammonia were manufactured. The Company's reserve fund at the close of the half year amounted to £23,702.

CORK GAS CONSUMERS' COMPANY.

The Ordinary General Meeting of this Company was held last Wednesday—Mr. T. Mahoney in the chair.

The Secretary (Mr. Denny Lane) having read the notice convening the meeting, the report of the Directors, with the accounts for the six months ending June 30 last, was presented. In the course thereof it was stated that there had been a slight decrease in the rental for private lighting, which was accounted for by the remarkably brilliant weather of the early summer. Public lighting remained about the same as before. The number of gas-engines employed was stated to be slowly but steadily augmenting; and in every case they were giving unqualified satisfaction. There was an increase in the cost of coal—attributed to advanced freights—in the six months; but it was less than the Directors had expected. On the other hand the returns from residuals were very satisfactory. In order to encourage the use of gas for power, heating, and cooking, the Directors have resolved to reduce the price for engines and manufacturing purposes, when the consumption exceeds 20,000 cubic feet per quarter, to 2s. 11d. per 1000 cubic feet; while the price for gas for cooking and heating will be reduced to 3s. 4d., when the consumption is sufficiently large to justify the expense of a separate meter for such purposes. The Directors allocated £350 to depreciation, bringing this fund up to £3618. After this provision, the balance of profit and loss stood at £5745, out of which they recommended that the usual dividend at the rate of 8 per cent. should be paid. This would amount to £5701; leaving £44 to be carried to the reserve. The Directors' report was, as usual, accompanied by one from the Company's Consulting Engineer (Mr. G. Anderson), in the course of which he pointed out that as the Company now supply a large quantity of gas in the day-time, an increased pressure from the works is necessary, which will involve vigilantly looking after the conditions of the mains, meters, and services, in order that the amount of gas unaccounted for may not increase. He added that, according to the figures furnished to him by Mr. Lane, the manufacturing operations of the Company had been carried on with great economy; the amount returned for residual products—always good—being above the average.

The Chairman, in moving the adoption of the report, said he saw the rental unfortunately did not show that expansion which was usual in more active centres of business. For instance, the Chartered Gas Company of London showed in six years an increase of 27 per cent. in the sale of gas; and many companies had an increase of 5 or 6 per cent. per annum. However, of late there appeared to be more stir in trade, and some new enterprises were about to be launched in Cork; whilst other branches of business—for example, the flax-mills—which had been suspended, were about to be revived. Any increase in the business and wage-earning capacity of the population could not exist without an effect—and a favourable effect—on the interest of a Company like theirs, engaged in supplying what had become one of the necessities of civilized life. He, therefore, had every hope of the extension of their business, and the consequent increase of profits. Another source to which the Directors looked for an augmentation of rental was the adoption of gas for cooking and heating purposes. With regard to cooking, those who had studied the question thoroughly, maintained that gas for such purpose was cheaper and better in every way than coal. This had been clearly demonstrated in the series of lectures on cooking by gas delivered by Miss Young, at the instance of the Directors, at the Company's depôt for gas-cooking appliances. These lectures, which took place in the spring, were well attended, and several orders for gas cooking and heating stoves were the immediate result. To encourage the movement in this direction, the Directors had arranged to reduce the price of gas for cooking and heating purposes to 3s. 4d. per 1000 cubic feet whenever the consumption was sufficient to cover the expense of supplying and fixing a separate meter, or in any case if the consumer would provide a special meter. The consumption of gas for engines being so much larger than that for cooking-stoves, the Directors proposed, in order to lead to a more extended use of these most convenient and excellent motive-power machines, to supply gas for these and similar manufacturing purposes at 2s. 11d. per 1000 cubic feet, wherever the average consumption exceeded 20,000 cubic feet per quarter. The reason they made these exceptional reductions in price was because the consumption of gas for these purposes was principally in the day-time, when the mains were comparatively idle; and, of course, the more the consumption could be spread over the 24 hours, the more efficient the mains and gasholders became in proportion to their size and cost. Some excitement had lately taken place on the subject of water gas, invented nearly 100 years ago by M. Lavoisier, the French chemist. His invention had been unearthed about every ten years, and enjoyed a weakly existence after every resurrection, only to sink again into oblivion. As water gas itself had no illuminating power, and even as a heating agent had considerably less than half the heating power of coal gas, there was not much to be feared from it. Some speculators were reported to have bought the patents for £200,000, and sold licences for certain districts for £1,654,000. The public accepted these statements with considerable reserve, as the shares had fallen from £25 to 20s. premium. Having alluded in fitting terms to the loss sustained by the Company by the death of Mr. J. O'Sullivan, whose place at the Board had been filled by the appointment of Mr. T. Bresnan, the Chairman went on to remark, in regard to the general position of the Company's affairs, that there was no reason to anticipate that the coming year would not be as prosperous as its predecessor. The Directors still had contracts running for coals purchased at what might be called the minimum price. The only element of danger was in the freight market, which was in a fluctuating and uncertain condition. It was hardly necessary to refer again to the electric light. He, however, might remark that the Chartered Gas Company of London, who supplied the district in which by far the largest number of electric lights were used, had just declared a dividend of 13¾ per cent. This showed, as they had always held, that there was room enough for all.

Alderman Madden seconded the motion.

Mr. H. R. Burke proposed that a dividend at the rate of 8 per cent. be declared for the past half year; and the proposition was agreed to.

The retiring Directors and Auditor were then re-elected; and the proceedings closed with the usual vote of thanks to the Chairman.

YORKSHIRE WATER GAS COMPANY, LIMITED.

The Statutory General Meeting of this Company was held last Saturday week at Leeds—Rear-Admiral Bythesea, V.C., C.B., presiding.

The Chairman, having explained that the meeting was called in compliance with the statute, said that the Company was registered on April 13, and was floated two days after; the shares being subscribed for many times over. Since that period there had been Stock Exchange transactions in London, which first drove the shares of the parent Company up to an unparalleled price; and then by a reaction brought them down again to something under what he believed was their real value. Acting as they then and still believed in the interests of the Yorkshire Company, and on the direct promise that there would be no disadvantage to the Company, the Board purchased British water gas shares to the amount of nearly £20,000. These shares, as the shareholders probably knew, had decreased in value. The promise that was given to them, however, had been more than ratified by the concession that had been made to them, free of all cost, of the county of Lancaster, the value of which was estimated at £101,000. The present position of the Company was this: For about £97,000, and possibly somewhat less—for the shares they held were slowly increasing in value—they had acquired rights which were valued at £202,000; and negotiations were still pending with a view to modifying the arrangements with reference to the balance of the cash (say, £15,000) still to be paid, and the position of the vendors' shares, till a substantial portion of the money subscribed had been repaid to the shareholders. The Directors had received 43 applications for plant—nine of these, representing a value of £10,080, had been settled; and tenders for 17 sets, of the value of £15,000 in round figures, were under consideration. The Leeds Forge had put up furnaces for melting steel by this process; and one of the largest shipbuilding firms in England, as well as one of the largest boiler-making firms, had made overtures to the Company for the adoption of water gas throughout their establishments. Before concluding, he said that the £97,000 he had alluded to was made up of £35,000 paid in cash to the Syndicate, £50,000 paid in shares, and about £12,000, the present loss on the shares they purchased.

Mr. Samson Fox stated that he believed in a short time the shareholders would have the opportunity of seeing a number of sets of plant at work. Drawings had been got out for plant for various capacities,—from 100 feet per hour to 20,000 feet per hour; and he believed that already patterns for three sizes had been made. Within the last fortnight he had made further investigations as to the production of open-hearth steel by this process. A furnace at the Leeds Forge would be adapted to that purpose; and if, as he had no doubt, the experiment was satisfactory, the result would be such as to command a very large sale of the plant, and to bring a large business to the different Companies.

A Shareholder called attention to the fact that two other companies had been floated for the manufacture of water gas, and asked what effect they would have upon this Company.

The Chairman said that, as far as he could gather, the new companies supplied only illuminating gas. He understood they proposed to use ordinary coal gas in conjunction with water gas, and to get the illuminating power from the coal gas.

A vote of thanks having been passed to the Chairman, the proceedings terminated.

BRADFORD CORPORATION GAS SUPPLY.

The Half-Yearly Balance-Sheet.

At the Quarterly Meeting of the Bradford Town Council last Tuesday—the Mayor (Mr. Alderman Moulson) presiding—the balance-sheet of the Gas Committee for the half year ending June 30 last was submitted, the chief features of which will be found in Alderman Priestman's remarks. The minutes of the Committee were also presented; and it appeared therefrom that a Sub-Committee had been appointed to inquire into the working of the establishment for the sale of gas-stoves and other similar apparatus, and that they had been instructed to make all necessary arrangements for the sale of stoves, &c., instead of letting them out on hire as heretofore.

Alderman Priestman, in moving the adoption of the balance-sheet, said there had been an increase in the consumption of gas during the half year, as compared with the corresponding half of last year, of above 22 million cubic feet, which had yielded an increase in revenue of £3300. There was an increase in the sale of coke to the extent of £1100; the sales having realized £7715. In tar, the increased amounted to £900; the receipts for the half year being £4738. Oxide had produced £580, which was equivalent to a decrease of £170. Chemicals had yielded £11,638; showing an increase of £400. The total revenue was £88,959. On the other side, the cost of coal amounted to £32,364—an increase of £1000. The carbonizing wages amounted to £7422—an increase of £500. The item of repairs of works showed a decrease of £4000; and the repairs to retorts, a decrease of £1400. There was an increase in the cost of public lighting; but the remaining items were nearly unchanged. The balance-sheet as a whole showed a net profit, after paying interest on the sinking fund, of £10,795, against £5535 last year. The various items in the balance-sheet remained practically the same as in 1888. The minutes of the Committee, he proceeded, included resolutions accepting tenders for the supply of cannel and gas coal. The supply would cost on an average 1s. 6d. per ton more than last year; and this would come to between £9000 and £10,000 per annum. Nevertheless the profit of the gas department was somewhat elastic. To whatever expenses the Committee were put, they still seemed able to keep their heads above water; and after the increase in receipts from tar and other things, he anticipated that even this large amount would

nearly melt away. Speaking of the electric light department, Alderman Priestman and that the works were upon the point of completion. He believed that experiments would continue through the remainder of the present month, and then those who wished to take the light would have the opportunity of doing so.

Mr. BAKER seconded the motion.

Mr. PRATT said he thought this was a very opportune time for raising the question whether some alleviation could not be made in the price paid for gas by the out-townships of Allerton, Tyersal, Thornbury, and Heaton, which were now part of the borough. Alderman Priestman had previously promised to look into the matter when a suitable time arrived; and he wished to know whether he intended to do so.

Mr. SMITH remarked that he was greatly obliged to Mr. Pratt for mentioning the matter to which he had drawn attention. The people of the out-townships were of opinion that they were not being fairly treated by the Corporation, and felt it very hard.

Alderman DUGGAN said he was glad to see that the Committee were considering the utility and propriety of maintaining their establishment for the sale of gas-stoves. He had always been against the Corporation acting the part of shopkeepers in opposition to people who were carrying on business in the town; and he had only accepted the proposition for the institution of this establishment because it was said that it was merely an experiment for the purpose of getting people into the way of using gas-stoves. But now it was developing into a regular trading concern; and he did not think it right that it should be so. He hoped the Committee would put a stop to it.

Alderman PRIESTMAN thought that every member of the Council would see that it would never do to have two prices for gas in different parts of the borough; and therefore the difficulty about which there was complaint would have to be met in some other way than that which had been frequently suggested. He thought they would all admit that, if the ratepayers of the out-townships did suffer in some respects, there were many points in regard to which they had derived advantage from their inclusion in the borough. As they were aware, there were other methods by which the difficulty could be dealt with; and he could not help thinking that the people of the out-townships could have obtained concessions from the gas companies which supplied them if they had not been a little short of pluck. At present there seemed to him to be no earthly reason why a small installation of electric light should not be put up in the out-townships, and then that would be an easy way of bringing the price of gas down. In one of the out-townships, the price of gas had already been reduced almost to the Corporation's figure.

The minutes and the balance-sheet were then passed.

THE GAS SUPPLY OF BROOKLYN.—According to the *Building and Engineering Record*, of New York, a syndicate of English capitalists, known as the International Gas Company, are reported to have purchased the plants of the Citizen's Gaslight Company and the Union Gas Company of Brooklyn, and the Union Gaslight Company in the Twenty-first Ward of that city, and are negotiating for the plant of the Brooklyn Gaslight Company. The Company own the patents for the Meeze process of gas manufacture for all countries outside Great Britain and Ireland.

GAS AT THE BIRMINGHAM ELECTRICAL EXHIBITION.—Gas is not altogether excluded from the exhibition of electrical appliances now being held at Birmingham, though there is not what may be called a representative display. A brilliant show is made by the Incandescent Gas-Light Company of their system of lighting. Mr. James Stott exhibits specimens of his well-known gas-governors; and the Patented Improvements Company show gas-governors and various patent gas lamps, stoves, &c. Muller's "Alpha" gas-making machines, for providing an illuminating gas from naphtha where coal is not available, are also to be seen. Various oil-lamp manufacturers have likewise secured positions for their wares.

ELECTRIC LIGHT WORKS AND "HORRIBLE SMELLS."—At the meeting of the Eastbourne Town Council yesterday week, a memorial was read from residents in the Junction Road, complaining of the nuisance caused by the smoke and "horrible smell" issuing from the works of the Electric Light Company. It was averred that when the wind was blowing south-west, the tenants could not keep their doors or windows open; and there had been several cases of sore throats and other affections through it. In the course of a discussion on the matter, Mr. Towner said, living in the neighbourhood as he did, he had been spoken to several times by the inhabitants about the nuisance; and unless the Company took the matter in hand, he should have to initiate steps to indict them for a nuisance. Mr. Martin described the nuisance as "beastly," and said it could not but give visitors a bad impression of the town. He proposed that the Company be served at once with notice to discontinue the smells. This was agreed to.

NORTHERN COAL TRADE.—A good inquiry has shown itself for steam coal of the best quality; and the price is firm at about 10s. per ton free on board. Most of the collieries producing this class of coal are actively employed, and have in several instances a rather long "turn" on. There is not so full a demand for second-class coal, and the price varies from about 8s. 6d. to 9s. 3d. per ton free on board—in some instances with a slight discount. Coal for the use of steamers is steady, at prices varying from 7s. to 8s. 6d. per ton free on board. Manufacturing coal is rather dearer; and some of the producers are asking very high prices for this class of fuel to be delivered over next year. For gas coal the demand is strong. A local gas company have concluded their contracts for another year's supply, and the price to be paid is 8s. 9d. per ton delivered. This is a very large advance on the prices of the coal under the contracts now expiring; but, on the other hand, the company are obtaining very much higher prices for their coke. The loss will therefore be small.

GAS *v.* ELECTRIC LIGHT AT BRYMBO.—Last Tuesday evening a public meeting was held at Brymbo, a mining district near Wrexham, to hear the results of a canvass of the principal consumers of gas in the district as to whether they were in favour of gas or the electric light—a proposal having been made by an electric lighting company about to be formed in Wrexham to supply that light. The question arose owing to the Brymbo Gas Company, which was started for the supply of private works, having given six months' notice that they will cease to supply the inhabitants with gas, owing to their works being inadequate for the purpose. It was stated that the result of the canvass was that 25 were in favour of gas, 11 for the electric light; and 17 undecided. A large number of cottagers expressed themselves willing to use gas, providing the landlords would put in the necessary fittings. The practicability of forming a gas company was discussed, and it was estimated that a capital of £2500 would be required to erect works capable of supplying 2 million cubic feet of gas per annum. The price would be from 2s. to 2s. 6d. per 1000 feet, against 4s. or 4s. 6d. for equivalent electric light. This soheme was not deemed feasible, as the supply of gas by the present Company would be stopped before the new works could be erected. Ultimately, it was decided to ask the Gas Company in the adjacent parish if they would undertake to furnish a supply, and what would be the cost. The meeting then adjourned.

THE SALFORD GAS SCANDAL.

SETTLEMENT OF THE CIVIL ACTIONS AGAINST HUNTER—A PETITION TO MITIGATE HIS SENTENCE.

At the Meeting of the Pendleton Highway Committee of the Salford Corporation yesterday week—Mr. Alderman M'KERROW presiding,

Alderman P. KEEVNEY inquired whether it was true that Mr. Samuel Hunter had paid to the credit of the Corporation £10,000 as a settlement of the moneys received by him as commission, or as between him and the Corporation.

The CHAIRMAN: Yes, it is true, I think. There is no reason for keeping it back. The statement has been made by the Mayor in a semi-public way. I think there is no reason to conceal it any longer.

Mr. W. STEPHENS: Any conditions?

The CHAIRMAN: No.

Alderman BOWES: What is the fact?

The CHAIRMAN: That he has paid £10,000 into the bank to the credit of the Salford Corporation. There are no conditions personal to Hunter, except this—that it is in settlement of all the civil actions. I thought when you asked what the conditions were, you meant relating to Hunter personally. The conditions meant that no official action should be taken towards getting a mitigation of the sentence. No such conditions are imposed. The condition is that all the civil actions against him and other contractors are stopped.

Mr. J. LINDSAY: Is it correct that members of the Corporation have signed a petition for his immediate release?

The CHAIRMAN: No, I do not know that it is. I believe Hunter's Solicitors have been asking members of the Corporation to sign a petition for mitigation of his sentence. It is a matter for the individual members of the Corporation. Anyone who has signed has not signed in his capacity as a member of the Corporation.

The subject then dropped.

Much excitement has been occasioned among the ratepayers of Salford by the announcement that the actions against Samuel Hunter and others had been settled, and that leading members of the Salford Corporation had petitioned the Home Secretary for a mitigation of Hunter's sentence. "The information," a Manchester contemporary states, "has caused great dissatisfaction amongst a section of the Salford Town Council. We learn that the petition was signed by at least three aldermen and several councillors, one of the latter being a prominent member of what is termed the 'old Gas Committee,' which exercised its functions during the time Hunter was in office. Although the signatories put their names to the petition as private individuals, and not as members of the Council, the promoters, it is urged, will supply the 'missing link,' and inform the Home Secretary of the high official position held by those who have appended their names to the document. We are told one member is so indignant that he has declared his determination never again to sit on a Committee with any of his colleagues who have signed the petition. With reference to the settlement of the civil actions by the payment to the Corporation of £10,000, it may be stated that a Special Committee was some time ago appointed by the Council to consult with the Town Clerk (Mr. S. Brown); and, if they thought fit, to settle the matter on the best terms they could obtain. This, doubtless, they have done. It is the intention of Mr. Mandley to raise a strong protest against the action of the Consultative Committee at the next meeting of the Salford Council; but in view of the powers delegated to that Committee by the Council, his protest will most likely be of little avail." Another local contemporary, after narrating the history of the negotiations which have led to what they designate the "Hunter Compact," informs its readers that the £10,000 will not be all clear gain to the ratepayers, as there will be something like £2000 to deduct for costs. The balance of (say) £8000 is to be transferred to the gas accounts, and finally divided between the three districts—Salford, Pendleton, and Broughton—in proportion to the relative business done by the Gas Department with each. In the final result, the payment should represent to the ratepayers about 3d. in the pound upon the whole rateable value of the districts. It is stated that "it was not understood in the Committee that the matter would be brought before the Council for confirmation; but it is regarded as certain that the arrangement must now come before the Council to be ratified. Probably any discussion which may arise there will turn upon the petition for Hunter's release rather than upon the amount of his offer. Upon this point, there seems to have been an amount of needless mystery. The fact is clear that men holding high positions in the Council have signed the petition, though they have been careful to do so in their private capacity." The petition for the mitigation of Hunter's sentence was forwarded early last week to the Home Secretary by Messrs. Bowden and Walker (Mr. Hunter's Solicitors). It sets forth that Hunter had been convicted of fraud and perjury; that he had lately made arrangements to hand over a sum of £10,000 to the Corporation; that he had suffered over a year's imprisonment; and that, as his health was precarious, the justice of the case would be met, under the altered circumstances, if the remaining part of the two sentences (which, it will be remembered, were for 12 months' imprisonment for forgery, and five years' penal servitude for perjury—the sentences to run concurrently) were remitted entirely. Among the signatures attached to the petition were the following:—Aldermen: A. L. Dickins, J.P., Mayor; W. Sharp, J.P., ex-Chairman of the Gas Committee; W. Brown, J.P.; Sir J. Farmer, ex-Mayor; J. B. M'Kerrow, J.P., member of Gas Committee; C. Makinson, J.P., ex-Deputy-Chairman of Gas Committee. Councillors: H. Lord, J.P., Chairman of the Gas Committee; and S. Rudman, member of the Gas Committee. The Town Clerk (Mr. S. Brown) also signed the petition. As will be seen by our "Parliamentary Intelligence," the petition was the subject of a question in the House of Commons last Friday, when Mr. Howell stated that if the reply of the Home Secretary was favourable, he would move for a Select Committee to inquire into the matter.

A proposition has been set on foot to hold a special meeting of the Town Council, at the earliest possible opportunity, to consider the whole of the circumstances; and the necessary requisition has been forwarded to the Deputy-Mayor (Sir J. Farmer) for the purpose. Mr. Mandley has given notice to the Town Clerk of his intention, at the next meeting of the Council, to submit the following motion:—"That any compromise of the claims of the Corporation for restitution of the moneys paid to the late Gas Engineer in the shape of commission, gratuity, or as a bribe in respect of any contract or contracts entered into with the Corporation, whether pertaining to goods bought or to goods sold by the Corporation, would be wrong in principle, derogatory to the dignity of the Council, and extremely adverse to the securing of purity in the administration of municipal affairs. Therefore this Council, strongly disapproving the settlement recommended by the Consultative Committee, hereby orders and directs the Town Clerk to proceed vigorously for the recovery of all sums so paid to Samuel Hunter, and from any other person or persons similarly implicated in transactions of bribery in connection with the Corporation contracts." In addition to this, Mr. W. Stephens will have on the *agenda* a motion in the following terms:—"That this

Council has learned with deep regret that a petition signed by so-called 'leading members' of this Council has been forwarded to the Home Secretary on behalf of Samuel Hunter; and hereby records its entire disapproval of the said petition, and emphatically repudiates the action of the said members in signing the same." The *Manchester Examiner*, referring to this motion last Saturday, said:—"Judging from the feeling displayed in Committee meetings this week, and from the replies given by aldermen and councillors to our inquiries, it is very probable that this resolution will be carried. At all events, a condemnatory resolution, in some shape or other, is pretty certain to be endorsed by a majority. In the meantime it is an open secret that the Home Secretary has been asked to stay his hand, and give no reply to the petition until he has heard what there is to be said against it."

ILKESTON CORPORATION GAS SUPPLY.

A Question of Payment for Extra Services by the Engineer.

At the last Meeting of the Ilkeston Town Council—the Mayor (Mr. Alderman Wade) presiding—a discussion took place on a recommendation by the Gas Committee to make the Gas Engineer (Mr. F. C. Humphrys) a grant of £50 for services rendered in connection with the recent extension of the works.

Alderman Tatham having moved the adoption of the minutes of the Committee containing the recommendation,

Mr. Mitchell objected to it, on the ground that the law provided that they could not pay a servant of the Council for extra services rendered. They were, he said, paying Mr. Humphrys £160 a year; and he was worth it. He was a clever man, and he (Mr. Mitchell) had nothing to say against him; but £50 for extra services was out of all reason. He moved an amendment that the recommendation be expunged from the minutes.

Mr. Fisher seconded the amendment.

Alderman Tatham said he had expected a discussion on the recommendation, and therefore had prepared a statement as to what Mr. Humphrys had done to entitle him to the grant. He then proceeded, at some length, to show (1) why the alterations at the gas-works were needed, and by whom they were carried out; (2) the extra work entailed on Mr. Humphrys in carrying them out; and (3) the advantages derived from the alterations. He said the alterations were needed to remove defects in the works. The make of gas, when the old purifiers and apparatus were designed, was 21¾ million cubic feet per annum, consumed by 535 customers. In 1888 the make had risen to 45 millions, consumed by 1078 customers. The Gas Committee went fully into the question by considering various schemes and plans laid before them, and they ultimately decided to adopt that of Mr. Humphrys, which was considered to be the most efficient and economical. The carrying out of the scheme was entrusted to Mr. Humphrys; and it was not in the least degree any part of the duties for which he was engaged, and for which he received remuneration from the Corporation. A detailed plan of the works had to be prepared in order to carry out the alterations with economy and efficiency. Three sets of specifications had to be drawn up, and 25 sheets of drawings executed. There were upwards of 11,000 pieces of ironwork, 5000 rivets, and over 4000 bolts; and where they were subject to various strains, it needed separate calculations for each to get the necessary strength. After preparing the plans and going through the whole of the calculations, Mr. Humphrys superintended the work; and it was done to the entire satisfaction of both the former and the present Committee. The work entailed upon him as a Gas Manager was carried on during the whole time in his usual efficient manner; so that the interests of the borough did not suffer in the slightest degree in that direction. As a proof of the care and pains bestowed by Mr. Humphrys on the work, his estimate was £2528, and the actual cost—after deducting £120 expended by the sanction of the Committee, but not included in the estimate—only exceeded the estimate by £3 7s. Taking all these facts into consideration, the Committee unanimously recommended the Council to vote this grant, as a fair and reasonable one for the extra services rendered; and he ventured to believe that the Council would confirm the resolution, if not unanimously, at least by a large majority.

Mr. Moss characterized the proposition as preposterous.

Mr. Haslam said it seemed to him that Alderman Tatham's explanation was a very satisfactory one. He, as a member of the Council, felt it incumbent upon him to give his assent to the recommendation of the Committee. If they had a good servant who served them well, let them treat him honourably and fairly.

Mr. Maltby as a member of the Committee, fully bore out the statement of the Chairman, because he considered they were only treating Mr. Humphrys with common fairness. He was one of the most intelligent servants they had, yet one of the worst paid. The least they could do for this extra work, extending over three years, was to allow him the proposed gratuity of £50.

Alderman W. Sudbury, as a member of the former Gas Committee as well as of the new one, considered it only a matter of common honesty to pay Mr. Humphrys the amount proposed.

Mr. Fisher contended that all Mr. Humphrys could do he was bound to do in the interests of the Corporation, without extra pay. While he was getting out the plans of the alterations he could not be doing anything else. He did not consider he was entitled to more than half £50.

The Mayor said he felt bound, from his long experience with the gas-works, to make a few remarks. The works, when the Local Board first bought them, were found inadequate to fulfil the requirements of a growing town like Ilkeston; and it taxed to the utmost the ability of the Gas Committee to supply the town with gas. Three years ago the question arose how they could supply the town with purer gas; and Mr. Humphrys satisfied them that he could grasp the situation if they would only take his advice. The Committee employed him with the distinct understanding that he should be compensated for doing the work; thinking it better than to employ anyone outside, who would have required £180. If they would examine the work done under the supervision of Mr. Humphrys, and go through the plans he produced, they would be struck with the ability he had shown. His plans and specifications came within £5 of the actual cost—showing his ability there. He did all his work with the clearest understanding that he should be paid for it. If the Committee had done wrong, let the Council censure them; but let them not commit a fraud on Mr. Humphrys.

The amendment, on being put, was rejected—only four votes being given in its favour.

Rosario Water-Works (New) Company, Limited.—A Company under this title has been registered with a capital of £420,000 in £10 shares, to acquire, by exchange or otherwise, shares in the capital of the Rosario Water-Works Company, Limited, and, concurrently with such acquisition, to take over the undertaking, assets, and liabilities of that Company, or any part or parts thereof; to acquire the benefit of the Rosario water concession; and to supply the town of Rosario, in the province of Santa Fé, with water.

BRADFORD CORPORATION WATER UNDERTAKING.

The Official Reports on the Proposed Additional Sources of Supply.

The report of the Water-Works Constructing and Sub-Committee of the Bradford Corporation Water Committee on the proposed additional sources of water supply for Bradford has been issued to the members of the Council. It is a comprehensive document, extending to 137 pages, in addition to maps, tables, &c. Appended to the Sub-Committee's report are those of the Water Engineer (Mr. A. R. Binnie, M. Inst. C.E.) and Dr. C. Meymott Tidy.

The Sub-Committee's Report.

The Sub-Committee's report opens with a concise statement showing the necessity for an extension of the water-works system. They compute that for the daily supply of the population in the borough and district (405,000), for domestic and trade purposes, they ought to have 12 million gallons of water; whereas they have now only a little more than 10 million gallons to meet this demand. Adopting as a basis of calculation a rate of increase in consumption of 33 per cent. in ten years, they arrive at the following figures for the next 40 years:—In 1887, the consumption was about 10 million gallons; in 1897, it will be 13½ million gallons; in 1907, 17½ millions; in 1917, 23½ millions; and in 1927, 31½ millions. During these investigations the Sub-Committee have inquired into the general financial position of the water-works. They find that the total capital cost of the works to date is £2,224,192, of which £185,000 has been paid off, leaving the debt at £2,073,743. Last year the revenue was £112,424; and deducting £20,827 expended on repairs, working, and maintenance, there remained £91,597, which in a commercial company would be available for dividend, and which would suffice to pay £4 2s. 4d. per cent. on the capital. The report then goes on to deal briefly with the two projects which have been under the Sub-Committee's consideration—(1) that deriving its supply from the Grimwith drainage area in the Wharfe Valley; (2) that for obtaining the necessary extension by works to be constructed in the upper valley of the River Nidd. These schemes have been inquired into in great detail; and the sites of the proposed works and drainage areas have been visited on several occasions by the Sub-Committee. The report describes the two schemes, and afterwards compares them. The Grimwith scheme will give a total supply of 10 million gallons a day; and the Nidd scheme, 17·3 millions. On the basis of the increase of the last ten years, the Grimwith scheme is estimated to last 22 years and the Nidd scheme 33 years. The Grimwith scheme is divided into three instalments; and the Nidd project into six. The first two instalments would bring in respectively 4250 millions from Grimwith, and 4750 millions from the Nidd; and these would last for about twelve years. But in the case of the Grimwith scheme, it would then be necessary to complete the whole project; while in the case of the Nidd, the third instalment of the works would carry the borough on for nineteen years. Thus, were the Grimwith scheme carried out, the Corporation would be compelled in about twenty years' time to again face the whole question of a large extension, while, were the Nidd project decided upon, the capital expenditure would be spread over a much longer period, and a supply would be obtained for the next 33 years. The total cost of the Nidd scheme is £1,222,000, working out to a rate of £70,636 per million gallons; and of the Grimwith scheme, £719,000, working out to £71,900 per million gallons—thus showing that, "notwithstanding all the advantages which the Grimwith scheme possesses in cheap reservoir sites, and the rapid fall of the conduit, yet as a scheme judged of by the rate per million gallons delivered per day, it is dearer than the Nidd project by £1264, or about 1·8 per cent." In conclusion, the Sub-Committee says: "When considering the cost of the Grimwith scheme, it must be remembered that we have been working on the basis of the engineering estimate only; but we cannot shut our eyes to the fact that it will cost much more, because if you undertake it, you will certainly be subjected to heavy payments in respect of claims by mineral owners and others. In whatever way we look at either of these projects, whether as first instalments, or as entire schemes, they are clearly very much cheaper than the average cost on the whole of our existing works up to date. Beyond the actual cost of the works, each estimate includes a sum of £20,000 for law and parliamentary charges. Proportionately, these may be expected to be heavier in the case of the Grimwith scheme, as it is one which would inevitably raise more points of contention than in the Nidd case. The sum allowed for unforeseen contingencies in the construction of the works, over and above the quantities and prices in the estimates, amounts in the Grimwith scheme to £62,900, and in that of the Nidd to £107,220. . . . As to the quality of the water, on the one side there is not one favourable opinion about the Grimwith water; and on the other, a perfect consensus of opinion in favour of that of the Nidd Valley."

The Engineer's Report.

The report of Mr. Binnie indicates that that gentleman has made a thorough and exhaustive examination of the two schemes before the Committee. In the first place it deals with the present situation, as brought about by the Corporation Water Act of 1854 (under which most of the existing low-level works were constructed), and particularly with the clauses of that Act, which relate to the Grimwith compensation reservoir. It is concluded that, in any scheme for taking the water of Grimwith, it would be necessary to construct another compensation reservoir of a capacity sufficient to compensate for the whole of the water which would be taken from the Wharfe Valley. The report confirms that 'of Dr. Tidy (referred to below) as to the quality of the water; and then the engineering aspects of the scheme are considered. Mr. Binnie reckons that, if proper provision be made for storing it, they could collect a daily supply of 9½ million gallons of water. If the top water of the present reservoir were raised about 30 feet, it would contain a total quantity of 1710 million gallons, which would afford the necessary safe storeage of 180 days' supply at that rate. To do this, Mr. Binnie proposes to construct an entirely new bank outside and below the present one, but abutting against it, which would be about 120 feet high, and 372 yards long, and would give a water area in the reservoir of over 204 acres. Proper residuum lodges would have to be constructed, with suitable bye-channels to carry the discoloured water in flood past the reservoir. A new outlet tunnel would also have to be made. The water from the reservoir would be discharged at about 800 feet above sea-level; and as there would be a rapid fall to Barden and Chelker, the pipes and masonry work would be of comparatively small size, and the length of the tunnels considerably reduced. The report points out the necessity that exists for a new conduit from Grimwith to Heaton, with a new service reservoir at Morton to hold about 89 million gallons. The new conduit would also enable the Engineer to use up a supply amounting to about half a million gallons per day from a gathering-ground in the Aire Valley, which at present runs to waste for want of such a conduit. Mr. Binnie states the cost of the complete project, as mentioned above, at £719,000; and then gives the advantages of the scheme, which appear to be considerably outweighed by the disadvantages, of which not the least important are the dirtiness of the water, and its action on lead after long storeage. The drainage area from which the water would flow is undoubtedly a rich

mineral district containing lead, baryta, and iron; and it would only b in a case of great necessity that such an area would be used for town supply.

The Nidd scheme is dealt with by Mr. Binnie at great length. First as to the quality, not only is the water of the district good and pure in itself, but superior to the present low-level supply; and it is proposed so to deal with it as to greatly improve the quality of the latter. This will be done by taking the clear, bright flow of the streams by a catchwater conduit, and mixing them intimately with the flow from the existing reservoirs at Barden. With regard to peat, it is pointed out that, from actual surveys, the peat area is only 8¼ per cent. of the total of 18,200 acres comprised within the drainage area; and on the vexed question of limestone, Mr. Binnie assures the Committee that none of the drainage reservoirs he proposes, or has proposed, on the Nidd, nor any of the areas with which he proposes to deal, are situated on the limestone formation properly so called. The report then deals with the question of soft and hard water, and its action on lead, and points out that the fine-weather flow of the streams and springs is much less energetic in its action than water collected immediately after rainfall. It is not a mere question of relative hardness or softness; for some very hard waters act energetically upon lead. While most water by storeage and exposure parts with this power of acting on lead, the water at Grimwith (like that at Huddersfield and Sheffield) appears to retain it to a remarkable and dangerous extent, even after long storeage. In the case of the Nidd scheme, the water would flow for nearly 38 miles through the conduit to Bradford; and this, it has been found, would materially reduce any capacity it might have for acting upon lead. With regard to the engineering aspects of the project, the suitability for the purpose of the drainage area is first considered. The River Nidd, above Pateley Bridge, has a course of about 14 to 15 miles to its source on the eastern flank of Great Whernside, and above that town has a drainage area of about 35,000 acres. With the exception of some 660 acres, the whole of this area is composed of the millstone grit. This area is too extensive for the requirements of the borough, and would involve too great an expenditure if dealt with as a whole. Granting that the necessary parliamentary powers had been obtained, Mr. Binnie's method of proceedure in developing the scheme most economically would be as follows:—(1) To deal only in the first instance with the dry-weather flow from so much of the Nidd drainage area as could be secured by a conduit extending to Armathwaite Gill and Howstone Beck. This would be 10,400 acres, and would yield 4,250,000 gallons a day. As for the first few years the whole of this would not be required, it might be found sufficient if the conduit from the Nidd were carried only as far as the Chelker Reservoir, with the proper connection with the Lower Barden Reservoir in passing that work. Of course this and the second instalment, charged as they would be (in this case as in that of the Grimwith scheme) with the cost of the parliamentary expenses, the full water compensation, and the necessity of constructing the tunnels and masonry portions of the full size required for the entire project, would prove proportionally more expensive per million gallons than the future steps of the project; yet an attempt might be so made to keep down the initial capital expenditure, and defer it to a future period. (2) It would be found, as time went on, that the existing conduit from Chelker to Bradford could not carry the increased quantity of 4,250,000 gallons brought in from the Nidd and required by the town; and the necessity for a new service reservoir at Morton would become apparent. Consequently the new conduit from Chelker to Bradford picking up the 500,000 gallons at Holden Wood would be required. This would form the second step; bringing up the supply to 4,750,000 gallons per day. (3) As the requirements of the town rose above this 4,750,000 gallons a day, the next step would be to bring in an increased supply from the Nidd drainage area. This could be done by extending the conduit from Armathwaite Gill and Howstone Beck up to the River Nidd at Woodale, the drainage to which would be 18,200 acres, and the average dry-weather flow at the rate of 7,400,000 gallons, which, with the 500,000 gallons from Holden Wood, would give 7,900,000 a day, (4) As this quantity became too small, the Angram reservoir could be constructed, which would increase the total supply, including that from Holden Wood, up to 10,600,000 gallons a day. As the quantity of water brought in from the Nidd, after the construction of the Angram Reservoir, would be 10,100,000 gallons, it would at this stage be necessary to duplicate the pipe-lines which cross the various valleys. (5) When required, the Haden Carr reservoir would be constructed, which would bring the supply up to 13,600,000 gallons a day. (6) As a final step, the Woodale reservoir could, when required, be constructed, which would complete the scheme, and bring the total supply, including that from Holden Wood, up to 17,300,000 gallons a day. On the question of cost, the report sets out the details of each of the six instalments. The cost of the first instalment would be £388,000; the second, £203,000; the third, £34,000; the fourth, £226,000; the fifth, £166,000; and the sixth, £205,000—making a total of £1,222,000. From this it will be seen that the Nidd project permits of the initiation of a large and well-digested scheme "in steps which will not involve throwing any greater burden on the town than is called for, and which gives us the assurance that the money spent from time to time is not a tentative and expensive attempt to allay a panic, but that each stage in the expenditure has been foreseen, and only leads up to the completion of the original design." The cost of the various reservoirs is much below that of many of the present reservoirs, and compares favourably with that of the Leeds works in the Washburn Valley. The advantages of the Nidd scheme are: "(1) That it is quite free from all complications arising out of previous legislation in our own Acts of Parliament, whether with mill-owners or mineral-owners, and involves the repeal of none of the existing rights which Parliament has granted to others. (2) The drainage area contains no lead or baryta, which would contaminate the water, or for the right to work which claims could be set up in the future. (3) It has a larger drainage area than Grimwith, in the proportion of 18,200 to 6350 acres, which will permit of the best water being sorted; and the storm water stored for compensation. (4) A heavier annual rainfall by 6 or 7 inches per annum than on any of our present drainage areas, consequently a more continuous flow of spring water and a larger yield per acre of drainage area. (5) A perfect connection with our existing reservoirs at Barden and Chelker, so deferring for as long a time as possible the construction of the reservoirs on the Upper Nidd, and avoiding a new tunnel under the Chelker reservoir. (6) It permits of the construction of a new service reservoir at Morton, and the utilization of the Holden Wood drainage area. (7) The possibility of extension when required, up to 17·3 million gallons a day, as compared with an extreme of 10 millions in the Grimwith case. (8.) A quality of water far superior both in purity and colour, not only to that of the Grimwith district, but to that of our present supply; so that the latter would be much improved by the water brought in from the Nidd; and its hardness and general quality would prevent its action on lead, and yet be soft enough for all trade purposes. It may be said, on the other hand, that the distance of the source of supply, and the length of the tunnels, is an objection; but this is not so.

DR. TIDY'S REPORT.

The report of Dr. Tidy relates to two inspections of the Grimwith and Nidd valleys, made by him in October, 1888, and April, 1889. In regard to the samples of water taken from the Grimwith reservoir, Dr. Tidy directs special attention to these two points: (1) Its high lead-dissolving power, which, he says, is a matter of grave importance; (2) the marked brown tint, even when seen in a tumbler, a colour which "proved to be of a very permanent nature." The colour is due to peaty matter acted on by iron springs (a combination, in fact, of iron with certain constituents of the peat) which, more or less, break out of the shale-beds along the whole course of the Blea Beck, and probably other becks as well. Considering the dark colour and dirty appearance of this water, the difficulty with which the colour is discharged on exposure to the light, its very large proportion of organic matter in solution, and its very high lead-dissolving power, Dr. Tidy says: "I have no hesitation in advising you that the water that I have examined taken from the Grimwith Reservoir, and as it is at present in the reservoir, is absolutely unfit, whether regarded chemically or medically, for the supply of a town." Passing to the Nidd scheme, Dr. Tidy says that all his samples were taken under conditions precisely similar to those under which the Grimwith samples were taken; and they are therefore strictly comparable. First, as to organic matter, while there is a little more in the Nidd waters than in the present Bradford supply, in the case of the Grimwith water the proportion is as 521 to 100. He has, he says, endeavoured to compare these waters in every possible way; and however they are taken, the results are enormously in favour of the Nidd Valley water. In regard to the power of dissolving lead, the Nidd water and the present Bradford supply are as nearly as possible identical; whilst the action of the Grimwith water is considerably higher. His conclusions in regard to the Nidd Valley are: "(1) That as a whole the drainage area is very clean; but that there is (as occurs more or less in all valleys) a certain quantity of peat on the area. (2) That the waters from the Nidd Valley are, under ordinary meteorological conditions, of excellent quality. (3) That, at times of continuous, and more especially of sudden rain, the water will more or less (according to the length of the previous dry weather; the rainfall, and the quantity of rain that falls within a given time) be stained with peat. (4) That it is desirable, if this Nidd scheme be adopted, that the water of the drainage area during the period of highest colour should be diverted." Dr. Tidy brings his report to a close by saying that the Nidd water specially lends itself to treatment whereby its action on lead may be enormously reduced. The same is true of the Grimwith water, but to a less extent. He finds the lead-dissolving power of the Nidd may, by efficient treatment, be reduced from 47 to about 8, and the Grimwith water from 78 to about 25.

At the Meeting of the Water Committee on the 6th inst., it was decided to recommend the Council to adopt the Nidd scheme, and take the necessary proceedings to obtain parliamentary authority for carrying it out. This recommendation will come before the Council at a special meeting to be held to-day.

NOTTINGHAM CORPORATION WATER SUPPLY.

THE ANNUAL REPORTS.

At a Special Meeting of the Nottingham Town Council yesterday week—the MAYOR (Mr. Alderman J. Renals) presiding—the annual report of the Water Committee was brought forward for approval. The Committee stated that there was an increase of revenue of £929, and that the working expenses had advanced by £488. Subject to the approval of the Council, it had been decided to carry to the depreciation and renewal fund the sum of £500, instead of £1000, as heretofore. They considered that amount, added to the interest of the surplus already accumulated, would be sufficient to cover the average expenditure on renewals, as shown during the past ten years. After putting aside this sum, and paying the annuities and interest on loans and consolidated stock, and the annual contributions to the different sinking funds, the ultimate balance of profits available for disposal amounted to £1216.

Alderman GRIPPER, in moving the adoption of the report, said there was one point to which he must direct the attention of the members, inasmuch as it dealt with an order of the Council made some years back. When the Committee took office with a view to administering this undertaking, it was seen that occasionally there would be large outlays for renewal of plant, which would seriously disarrange their finances in the years in which they occurred. It was accordingly felt desirable to set aside a special sum to carry out these renewals; and it was resolved that £1000 a year should be reserved for the purpose. This amount was purely a guess, as they then had had no experience. But now, after the experience of a number of years, the Committee were of opinion that the appropriation was larger than was necessary, and that they might do with a smaller sum. An accumulation of £6760 had already taken place, which was invested for future use if needed. As the average amount expended had been £500, it would be sufficient if £500 were annually appropriated out of the revenues of the undertaking, with the interest of the accumulation. It would give them, in round figures, £700 a year to deal with these matters when they occurred. They had had in one year to expend nearly £3000 upon this account. The Committee thought that now they were looking forward to all the sources of income they could collect, it was a desirable time for the Corporation to act as suggested; and therefore the Committee proposed to provide annually, in the way stated, £500 instead of £1000. As it was, there was a balance in hand of £1216.

Alderman CROPPER seconded the motion; and the report was adopted.

The first annual report of the new Engineer of the Nottingham Corporation Water-Works (Mr. L. T. Godfrey Evans) has been published. He commences by giving an interesting description of the undertaking as he took charge of it on Aug. 1 of last year. Allowing for a population of 268,000 and 57,000 houses, the available supply is about 9000 million gallons per annum. The Park supply gives rather more than 2 million gallons a week; but, if necessary, 6 millions could be pumped during the same period. The Basford supply gives 10 million gallons weekly, with a possible increase of 5 million gallons; while 12 million gallons per week is the quantity pumped from the Bestwood Park Estate supply, which can be increased to 20 million gallons, if required. The same quantity is obtainable from the Papplewick supply. Mr. Evans states that he has been down the wells, and finds them in excellent condition; yielding an abundance of water possessing every necessary qualification of purity and goodness. The available supply of 9000 million gallons per annum appears to him ample to meet the present requirements, and indeed, those of some distance ahead. Speaking of the machinery at the Park and Basford stations, Mr. Evans says that, in his opinion, they were not designed or erected with the object of continuously forcing water to a height of 300 feet; and he points out that, in case both these engines should fail at one time (a contingency not at all foreign to pumping machinery), the district of Mapperley would not only be void of anything like an efficient water supply (as regards pressure), but would be very imperfectly protected in case of fire. The following are the reservoirs with their approximate capacities:—Park

Row, 2,200,000 gallons; Belle Vue, 2,248,376 gallons; Mapperley, 1,795,494 gallons; Red Hill, 2,004,960 gallons; Papplewick, 1,527,120 gallons—total capacity, 9,775,930 gallons. The report points out how inadequate these reservoirs seem to store any reasonable supply for so large a town and district as Nottingham. Taking the maximum weekly consumption (which is the only sound basis for such calculations), Mr. Evans finds that on one occasion 50 million gallons were pumped. Assuming the consumption to be fairly constant, it will be seen, he says, that seven millions must have been used in one day, although the probability is that more would be used, as the maximum. The present storeage capacity is 9,775,930 gallons—no greater than in 1885, when Mr. Tarbotton spoke of it as being "even less than two days' supply." Thus it will be seen that there is now, under maximum conditions, little more than one day's supply. Mr. Evans acknowledges that the Corporation possess ample pumping power; but he thinks it well and necessary, in his first report, to give the impression that most forcibly strikes him as to the present system of reservoir storeage and supply. It is stated that the length of mains laid down for the year ending March last was 7¾ miles; and the number of gallons supplied per head per day was 17·4.

WORCESTER CORPORATION WATER UNDERTAKING.

The Projects for Augmenting the Supply.

At the Monthly Meeting of the Worcester County Council last Tuesday—the Mayor (Mr. Alderman Day) presiding—the question of obtaining an additional supply of water for the borough was again under consideration. The Water and Sewerage Committee reported that the Surveyor had laid before them two tenders for making a 12-inch borehole at Charford. The tender of the Diamond Rock Boring Company was for about £1230 (to bore 700 feet deep), exclusive of lining tubes; and the Company stipulated for a supply of water gratis, of 10 to 12 gallons per minute. The other tender from Messrs. Le Grand and Sutcliff to make a similar borehole was about £1220. Messrs. Dowcra and Son had also been asked to tender; but they would not undertake the work except at a schedule of prices for the hiring and working of their boring machinery. The Surveyor, upon instructions, had estimated the cost if Messrs. Dowcra and Son's terms were accepted; and he reported that in his opinion the amount would be about £1100. Mr. Corbett, the Chairman of the Committee, referred at length to the three alternative schemes that were before the Council in December last. One was to retain the present works, and make certain improvements. The second idea was to purchase the East Worcestershire Water Company's works, at £55,000—a price which the Committee regarded as excessive. The third project was to bring a supply of water from Bromsgrove. The Committee had gone a step further and had ascertained the cost of making a 12-inch bore into the red sandstone just beyond Charford, with a view to proving whether water existed there in sufficient quantities. In obtaining a supply for themselves, the Surveyor had estimated that the mains could be laid down at a cost of £27,000; and the total expense might amount perhaps to £40,000. The security being so good, the Council would have no difficulty in borrowing the money at 3½ per cent.; and, allowing a liberal sum for depreciation, the cost to the Council would not amount to more than £2000 a year. Having referred to the spot where it was proposed to make borings, which was situated on the Lickey just beyond Charford, Mr. Corbett said that, owing to the fact that the water would flow from Bromsgrove to Worcester by gravitation, the cost of pumping, as well as of filtration, would be saved; and instead of spending a large sum in enlarging the present works, the Committee asked the Council to expend a similar sum to enable them to get a perfectly pure supply. He therefore moved that a 12-inch bore be sunk to ascertain whether a sufficient supply of potable water could be obtained. Mr. Buckland seconded the motion. The Sheriff (Mr. G. H. Williamson) said that he could not support the motion; as he thought that they ought to do all they could to obtain a supply from the East Worcestershire Company. If the Council constructed the works and found that there was not a sufficient supply, all the outlay would be thrown away. The East Worcestershire Company had undertaken to supply the amount of water required at 1½d. per 1000 gallons, if the minimum consumption was a million gallons a day; and under these circumstances they would have a supply without any outlay of capital, and at such a cost as would allow them to make as much profit as they obtained now. He moved as an amendment—"That the Water and Sewerage Committee be requested to write to the East Worcestershire Water-Works Company inquiring whether they can supply the Council with water at the rate of 1½d. per 1000 gallons, if a minimum of one million gallons a day were supplied, on condition that the supply extend over a period of 21 years, renewable at the option of the Town Council at the end of that period." The amendment having been seconded, an exhaustive discussion followed; but in the end both the amendment and the original motion were lost.

WOLVERHAMPTON CORPORATION WATER SUPPLY.

The Annual Report.

At their Quarterly Meeting yesterday week, the members of the Wolverhampton Town Council had before them the annual report of the Water Committee. Alderman Wright, in submitting the report (which stated that the profit amounted to £1742, after paying interest on capital, providing for sinking fund, and paying the balance of costs under the Bilston arbitration award) explained that the receipts for water had amounted to £22,843, or £764 more than in the previous year; and this showed that the town had appreciated the quality and quantity of water supplied, as people who formerly did not take the water were now doing so. He was afraid his Committee would not be able to present so good a report next year, as coal and other articles were dearer, and likely to remain so. The items of interest on loans and instalment of sinking fund, too, were growing heavier, owing to more money having been borrowed for extensions of the plant at Cosford, which was not completed; and they were not yet deriving any benefit from the expenditure. The Bilston arbitration expenses amounted to £657; and he hoped that such an item would not occur again, as he trusted the dispute which had arisen between the Corporation and the Bilston Commissioners would be arranged (*ante*, p. 180). The Bilston Commissioners had taken more water than in the previous year; the receipts under this head being £2706 for 129,918,055 gallons, as compared with £2491, and 119,573,228 gallons in the previous year. Although there had been more water distributed by his Committee, there had been less coal consumed by about 430 tons; and so there had been a saving under that head. The quantity of water consumed for domestic purposes was 19 gallons per head; and the daily average consumption for all purposes was 2,770,719 gallons. Mr. Cousins remarked that he was of opinion that the balance of profit should be placed to the credit of the borough fund; but Alderman Wright said it would be better to allow the balances of profit to accumulate until they had a reserve fund of £10,000. The report was adopted.

COVENTRY CORPORATION WATER SUPPLY.

Proposed New Reservoirs.

At the Meeting of the Coventry City Council last Tuesday, the minutes submitted by the Water Committee stated that they had considered the question of acting upon the powers of the Act which they obtained last session by commencing the execution of the works authorized. In the opinion of the Committee, the service reservoirs at Barker's Butts should be first constructed, with the necessary mains; and that the reservoirs should be made to contain at least 3,000,000 gallons. They also desired that Mr. Hawksley should be asked to meet and advise the Committee. Alderman Matterson, in moving the confirmation of the minutes, said it would be as well if he gave some explanation as to the cause which had influenced the Committee in arriving at such an early decision to commence the work in accordance with the new Act. It would be within the recollection of every member of the Council that from time to time serious complaints had been made to the Water Committee and to the Council of the inefficiency of the supply of water to the higher parts of the town. To remedy this would necessitate the building of the new reservoirs at Barker's Butts, which would ensure a constant and regular supply to those localities which had hitherto only had it intermittently. The present supply of water was considerable—being quite 1½ million gallons daily; so that they had quite a sufficient quantity of water at the present time to give the necessary supply to the outlying districts. Mr. Kendrick seconded the proposition; and the minutes were then confirmed.

Following up the above proceedings, a meeting of the Water Committee was held on Thursday in reference to the construction of the new reservoirs at Barker's Butts. Mr. T. Hawksley was present; and, after a long discussion, it was decided to construct two reservoirs (to be covered in) of a capacity of 1½ million gallons each. The existing reservoir at Radford will be discarded; and the water will be pumped from the Spon End works by the present engines to the new reservoirs. Mr. Hawksley was instructed to prepare plans and specifications for the construction of the new reservoirs, and for laying the necessary mains to convey the water to and from them; and to obtain estimates for the execution of the work.

THE WATER UNDERTAKING OF THE BARRY AND CADOXTON GAS AND WATER COMPANY.

The Bill promoted in the present session by the Barry and Cadoxton Water Company, for the purpose of obtaining the authority of Parliament for the raising of additional share and loan capital, has passed the Upper House, and has lately been specially reported upon by the Chairman of Ways and Means of the House of Commons (Mr. Courtney), before whose Committee it came a short time since. The report states that it was proved to the Committee that none of the water-works authorized by the Company's Act of Incorporation (the Barry and Cadoxton Gas and Water Act, 1886) had been constructed, and that since the passing of that Act it had been ascertained that those water-works would not be efficient for the objects intended to be accomplished, and that the district included within the Company's limits could not be supplied with water by means of such works, and that the works authorized by the Bill were in substitution for those sanctioned by the Act of 1886, except in so far as the latter might be made available as supplementary to the proposed new works. It was further shown that the undertaking of the Company was in course of development, that none of their works were completed, that they had not paid any dividend on their existing share capital, and that if provision were made in the Bill for the offer of the additional water share capital proposed to be raised by public auction, the shares would not, in all probability, realize a price equal to par; but that if the Company were empowered to dispose of the shares in the manner prescribed by the Companies' Clauses Consolidation Act, 1863, they would probably be able to dispose of them at par, which would be advantageous both to the Company and the consumer. Under these circumstances, the Committee expressed the opinion that in this case, and so far only as regards the additional water share capital, the provisions of the Standing Order requiring the submission of such capital to public competition ought not to be enforced.

New Filter-Beds for the Bradford Corporation.—At the quarterly meeting of the Bradford Town Council last Tuesday, the minutes of the Water Committee (which were adopted) included a resolution accepting the tender of Messrs. Holdsworth Bros., of Wyke, for the construction of filter-beds at Thornton Moor, at a cost of £7967.

Brush Electrical Engineering Company, Limited.—A Company under the above title has been registered with a capital of £750,000, in 150,000 preference shares of £2 and 150,000 ordinary shares of £3 each, to acquire by transfer (for the purpose of reconstituting the Anglo-American Brush Electric Light Corporation, Limited) the undertaking and business heretofore carried on by the Anglo-American Brush Electric Light Corporation, Limited, in the United Kingdom and elsewhere, and also the letters patent and patent rights, and the lands, buildings, works, and plant held, occupied, and used by the Corporation; to acquire the undertaking and business of the Falcon Engine and Car Works, Limited, at Loughborough, and the stock-in-trade, effects, and other property of that Company; and to carry on the businesses of electricians, mechanical engineers, and manufacturers of any kind of electrical apparatus and appliances, and workers and dealers in the same.

The Oswestry Town Council and the Liverpool Water-Works.—At the monthly meeting of the Oswestry Town Council on Monday of last week, one of the principal subjects discussed was a notice of motion by Mr. Porter, to consider the advisability of requiring the Liverpool Corporation to supply the Oswestry Town Council with an independent report as to the safety of the Oerley reservoir. The Clerk suggested that, instead of dealing with Mr. Porter's proposition independently, it would be better to join with the Shropshire and Worcestershire County Councils, and the Bridgenorth and other Town Councils, and thus consider the whole question. Alderman Bayley proposed that the Mayor and Alderman Owen, C.E., be appointed a deputation to represent the Oswestry Town Council in the matter. Alderman Owen said he should decline, as he had formed a very strong opinion on the question. Mr. Porter observed that he had no objection to the merging of the Oswestry deputation with that of other towns; for it appeared to him that the Oerley reservoir was but a small thing compared with the vast works at Llanwddyn. With regard to the reservoir, it was said that the puddled clay of the embankment contained too much vegetable matter and sand, and too little of that of which it ought to be composed. The Mayor said that the County Council proposed to make a representation to the Local Government Board to compel the Liverpool Corporation to have an independent inspection and report of the work from Llanwddyn all along the line to Oswestry; and therefore he considered that, if they joined that deputation, they would obtain all they desired. Mr. Cason seconded a proposition that the Mayor and Town Clerk attend as a deputation from Oswestry; and this was agreed to.

NOTES FROM SCOTLAND.

(FROM OUR EDINBURGH CORRESPONDENT.)

EDINBURGH, *Saturday*.

Arbroath is an enigma. The Gas Corporation there, which but a few months ago haggled at the cost of improving the gas-works, are now favourably considering a proposal that they should themselves take up the supply of electric light in the town. As in other places, notice had been received from the Scottish House-to-House Electricity Supply Company, that they intended to apply for powers to supply Arbroath; and after a joint meeting of representatives of the Gas Corporation and of the Police Commission, it was resolved to oppose the application of the Company. The Gas Corporation met on Monday, and accepted the minutes of this meeting—Provost Anderson at the same time giving notice that he would, a month hence, move that they refuse to give their consent to the Company; that they oppose the Company's application before the Board of Trade; and that they request the Board of Trade to give the Local Authority time to consider the needs and desires of the community, and the desirability of the Gas Corporation itself applying for a Provisional Order authorizing them to provide electricity within the limits prescribed by their Act of Parliament, if such should be required in the locality. This is the first gas supplying body in Scotland to cherish the idea of furnishing both lights. To be sure they are not taking to electric lighting on account of any love for it; the matter has been forced upon them. This may account for the somewhat curious proposal they make—which is to oppose the Electric Supply Company, and then to consider whether they should take up the business themselves. If they pass the Provost's motion, they will be in danger of following the same course as they did with the improvement of the gas-works—that is, first agreeing to do the thing, and then, on inquiry, finding it to be too costly, and endeavouring to get out of the situation. To me, it seems that the first step should be to count the cost of company and of corporation supply, and the probabilites of success before the Board of Trade; and only after that should they resolve upon their attitude towards the Electric Light Company. The course they are following is certain to lead them into expense before the Board of Trade, where they are more likely to fail than to succeed, and whether they or the Company get the power, the cost to the community of establishing the light, if it should ever be required, will be increased by these initial expenses. I wonder, if it does not now occur to them, that they would have been in a better position to face this question if they had been able to inform the Board of Trade that they had improved their gas-works, and were selling gas at a figure so low that no other light could compete with it.

The Bo'ness Gas Company has offered to reduce the price of gas for the public lamps from 17s. for ordinary, and 30s. 6d. for large lamps, to 15s. 6d. and 28s. respectively. Even at the reduced price some of the Police Commissioners think it is too high, and the matter was sent to the Lighting Committee.

The standard weights and measures in Scotland are at present being tested in Edinburgh, by Mr. H. J. Chaney, for the Board of Trade. Mr. Chaney is also at the same time conferring with the principal inspectors of weights and measures in Scotland with reference to the carrying out of the new Weights and Measures Act. It is three years since the last inspection of the Imperial standards took place.

Intimation has been made to the Water Commissioners of Perth, on behalf of Sir James Richardson of Pitfour, to the effect that he will claim compensation from the Water Commissioners for the abstraction of water from the Tay, to the injury of his fishing at the North Inch, in connection with the works for the auxiliary water supply for the city. A suggestion has been thrown out that the Commissioners should make an offer, or agree to refer the matter to arbitration; and meanwhile the agents of Sir J. Richardson have been called upon to furnish a statement of the nature and particulars of their claim.

An outcry has arisen at Dunfermline that there is insufficient water pressure in part of the town; and the subject came up for consideration at a meeting of the Town Council last Monday. The Water-Works Committee recommended the laying of a 10-inch main, where there is at present a 6-inch one. The cost is estimated at £1650. A meeting of the Council is to be held on an early date to discuss the proposition.

The Assistant Burgh Surveyor of Aberdeen (Mr. W. Dyack) has reported to the Water Committee of the Town Council, recommending the adoption of Deacon meters, to check the waste of water in the city. Experiments have been made with the meters, which, he says, conclusively prove that there is an enormous quantity of water running to waste, and that it is perfectly and comparatively easy to prevent in a large degree such a waste. Taking one district—the middle service supply—the quantity of water consumed in it daily is about 750,000 gallons daily, of which he estimates that 450,000 gallons are wasted. The water for this district is pumped at a cost of about ¾d. per 1000 gallons; and thus, besides the loss of water, there is a loss of about £340 annually in pumping water uselessly. He has followed out the whole working of the Deacon meter system, and has no hesitation in saying that it is an admirable system for coping with the difficulties of the waste-water question; embodying both simplicity and efficiency with economy in working. The cost of introducing it into Aberdeen would be about £2500; but he recommends that it be introduced to the middle district only this year, at a cost of about £500—leaving the other districts to be taken up in subsequent years. He does not expect that the whole £340, which the pumping of waste water in the middle district costs, would be saved in the first year. The saving would probably be £150, and would be progressive year by year; so that in three or four years the whole cost would be entirely repaid.

(FROM OUR GLASGOW CORRESPONDENT.)

GLASGOW, *Saturday*.

With regard to the contract for the residual products at the Glasgow Gas Commissioners' Dalmarnock Works, for which tenders were asked some time ago, I am informed that, on the recommendation of the Gas Committee, it has been resolved to accept the offer made by Messrs. George Miller and Co., of Glasgow. The tender, however, is only to hold good for a term of three years; whereas in the case of the secondary products at the other two works—Dawsholm and Tradeston—the contract is to remain binding on both sides for a period of five years. If I am not mistaken, only three tenders were lodged for the Dalmarnock residuals; and one of them came far across the Border. Messrs. George Miller and Co. have had the Dalmarnock contract, I think, without a breach for very many years. Their works are most conveniently situated to the Dalmarnock Gas-Works; and I am almost certain that they were started primarily and purposely for the treatment of the tar and ammoniacal liquor made at the gas-works. I may incidentally mention that Mr. C. Greville Williams, F.R.S., was professionally employed by Messrs. Miller and Co. to carry out investigations at their works regarding the derivatives for coal tar in the early history of the aniline dyes. He had previously been principal assistant to the late Dr. Thomas Anderson, Professor of Chemistry in the University of Glasgow.

According to one of the Glasgow engineering papers to-day, Lanark lags woefully behind in the movement for cheap gas. A dividend of 7½ per cent. has recently been declared by the Lanark Gas Consumers' Company; but the price of the gas is to be continued at 4s. 2d. per 1000 cubic feet—the same as for the last nine or ten years. For the present there is to be no reduction. At the neighbouring town of Carlisle, where the make of gas is not half that of Lanark, and where about seventy street lamps are lighted free of charge, the Gas Company can afford to sell gas at 3s. 9d. per 1000 feet, and yet make a profit to pay dividends. The writer seems to think that Lanark needs a visit from some successor to Mr. Flintoff, the gas reformer of fully thirty years ago, whose appearance in the capital of the Upper Ward of Lanarkshire is doubtless still fresh in the memories of some of the Lanark gas shareholders.

During last month the make of gas at the three works belonging to the Glasgow Corporation Gas Commissioners amounted to 102,968,000 cubic feet, as compared with 103,538,000 cubic feet in the corresponding months of last year. There was thus a decrease in the monthly output amounting to 620,000 feet. There was also a decrease in the output for the month of June as compared with that of the corresponding month of 1888; the respective totals being 100,135,000, and 102,073,000—showing a decrease of 1,838,000 cubic feet. The difference in favour of June and July last year may be accounted for by the large consumption in the exhibition, which was then in full swing, and to the greater demand on the part of consumers generally, who were more attached to their homes than they were during the past two months. There is also the fact that the weather this year has been of such a character as to require a smaller consumption for heating and lighting.

I am told that the Works Committee of the Glasgow Gas Trust have intimated their willingness to recommend that a supply of gas shall be given to the Dalmuir district of the burgh of Clydebank, provided that a limited liability company or other responsible body be constituted to take the gas from a meter at the termination of the mains at Clydebank proper, pay for the necessary extension of the mains to Dalmuir, as also for the gas registered at the meter—the price to be the same as that charged in Glasgow and the immediate suburbs. These terms are more favourable to the Gas Trust than those on which a supply of gas has been given to Clydebank for a number of years. I am not yet informed if the people who have been moving in this matter at Dalmuir have consented to take the gas on the terms mentioned. They may ultimately find it to be more profitable, and involve less responsibility to themselves, if they take the gas which has been brought almost to their own doors by the Dalmuir, Kilpatrick, and Bowling Gas Company, whose price is very much lower than when the present proprietors purchased the works five or six years ago.

There seems to be a prospect of some action being taken by the gas consumers of Cambuslang to secure a reduction in the price which they have lately been charged for gas. A public meeting is likely to be held very shortly for the consideration of the subject. It may be remembered that I referred to this matter last week; and I find that much additional correspondence has taken place on the subject. One of the grievances which the gas consumers have, besides the high price complained of, is the large deposits that are demanded from intending consumers before they can have gas "laid on" to them. It seems that some of the shopkeepers have paid deposits ranging from £1 to £2 each, and that these, in a number of instances, have been lying from five to ten years in the bank at the credit of the shareholders rather than at the credit of the depositors, who certainly are deriving no interest from them.

At the meeting of the Port-Glasgow Town Council last Monday, the Gas Committee minutes for the preceding month were under consideration.

They embraced an estimate of the revenue and expenditure for the current year, and a recommendation that the price of gas be reduced 4d. per 1000 cubic feet, making it 4s. 2d., from and after Oct. 1 next, being the commencent of the next quarter. The adoption of the minutes was moved by Bailie Fyfe, the Convener of the Committee, who considered that the Committee were quite warranted by the healthy state of the finances in recommending such a reduction in the price of the gas. For his own part, he would have liked that the reduction could have been somewhat larger; but at the same time he was inclined to wipe off as much of the debt on the gas-works as possible, because the longer it hung over them, the longer the Police Commissioners would be compelled to keep up the price of gas. He had also to say that the Committee had thought of abolishing the meter hire altogether; but seeing it was such a nominal charge, they had decided, after a little discussion, to allow it to remain in the meantime. Mr. Macfarlane said that he would have been in favour of abolishing the rental on all small meters. He was sorry the Committee had not seen their way to do so; but he hoped by next year they would move for its abolition. Provost Crichton seconded the adoption of the minutes, which were then passed.

At a meeting of the Greenock Corporation Gas Committee held last Tuesday, it was agreed to recommend to the Police Board (Gas Trust) at their next meeting, that the price of gas should be reduced by 2½d. per 1000 cubic feet—viz., from 3s. 6½d. to 3s. 4d. A year ago a similar reduction was made, when the year's profits were £3100; and it is thought that the surplus profit of £2345 on the past year's working will quite warrant the reduction recommended by the Gas Committee.

Several transactions have taken place during the week in the shares of the Partick, Hillhead, and Maryhill Gas Company—generally at about £5 5s. per share.

There has been a little more fluctuation in prices in the Glasgow pig-iron market this week; the lowest for Scotch warrants having been 45s. 9½d., and the highest 46s. 8½d. per ton, while the closing price yesterday afternoon was 46s. 4½d. per ton cash buyers. There have also been marked fluctuations in the price of hematite and Cleveland warrants. A number of the Scotch special brands have been advanced in price at least 1s. per ton during the week; the top quotation being now Coltness No. 1, 60s. Summerlee No. 1 is quoted at 59s.; and Langloan, at 58s.

Very little that is new falls to be reported in regard to the business position of the coal trade. The shipping branch continues to be on a very healthy scale; and prices remain steady and firm. Most of the other branches of the trade are in a like condition.

NELSON LOCAL BOARD GAS SUPPLY.—The abstract of the accounts of the Gas Department of the Nelson Local Board for the year ending March 25 last, has just been prepared. On that date the total amount of money borrowed on the gas-works account was £54,580, still leaving £36,641 to be borrowed. The cost of the gas made last year was £9902, inclusive of £5668 for the purchase and carriage of coal, £1298 stokers' wages, and £2342 repairs and maintenance of works and plant, &c. The distribution of gas involved an expenditure in salaries and repairs, &c., of £751 3s. The profit during the year was £3538 6s., and the income from the sale of gas £14,394 the total income being £16,948, and the expenditure £13,410. The capital account gives the value of the assets as £64,580, including the balance of £41,201 on March 25, 1889; and among other items is £14,332, the cost of Brierfield works.

CURRENT SALES OF GAS PRODUCTS.

LIVERPOOL, *Aug.* 17.

Sulphate of Ammonia.—There has been more doing this week; and the market at the close is pretty well cleared of prompt parcels. The German buyers, who have been rather stubborn in withholding their orders, are now sending limits at more reasonable rates; and if their wants are not yet fairly filled, they will be compelled to pay full values for anything they may require this month. Buying has been principally directed to delivery f.o.b. Leith, at which port the requirements have been most urgent. At the beginning of the week £11 17s. 6d. was the value; but prices have since advanced. The sales at Hull have been limited, owing to the small quantity available; most of the manufacturers still being busy with renewals and repairs. The rates paid are above last quotations; but the advance is not quite as much as at Leith. To-day's prices are £12 at Hull; £12 2s. 6d. at Leith; and £12 at Liverpool—the market closing with a firm tendency. In nitrate, the spot market is rather better; the dealers having secured the bulk of the stock. Prices have been put at 8s. 6d. to 8s. 7½d. There are no new features in cargoes.

LONDON, *Aug.* 17.

Tar Products.—Benzols continue to improve, and as high as 2s. 11d. has been paid for 90's, and 2s. 2½. for 50's, for spot. Creosote is scarce; and good liquid oil commands a ready market at 3d. per gallon. Carbolic acid, anthracene, and pitch are in fairly good request at former rates. Prices: Tar, 21s. to 27s. 6d. per ton, according to position. Benzol, 90 per cent., 2s. 11d. per gallon; 50 per cent., 2s. 2d. per gallon. Toluol, 1s. 5d. per gallon. Solvent naphtha, 1s. 4d. per gallon. Crude naphtha (30 per cent.), 1s. per gallon. Light oil, 3½d. per gallon. Creosote, 2½d. per gallon. Pitch, 22s. to 23s. 6d. per ton. Carbolic acid (60's), 3s. 9d. per gallon. Cresylic acid, 10d. per gallon. Tar salts, 15s. to 20s. per ton. Anthracene (30 per cent.), "A" quality, 1s. 2d. per unit; "B" quality, 11d. per unit.

Ammonia Products.—Sulphate is changing hands, in jobbing lots, at £11 15s. to £12 per ton according to position. The market is undoubtedly firm; and prospects are good. Prices: Gas liquor (5° Twaddel), 7s. to 8s. per ton, with a rise or fall of 1s. 6d. per degree. Liquor ammonia, 1¼d. per lb. Carbonate of ammonia, 3d. to 3½d. per lb. Muriate of ammonia, brown, £18 10s. per ton; white, £23. Sal-ammoniac, £30 to £32 per ton.

THE PUBLIC LIGHTING OF WORCESTER.—At the meeting of the Worcester Watch Committee held last Friday, a letter was received from the Worcester Gas Company offering to continue the lighting of the city for the next three years at the same price as at present. The Mayor (Alderman Day) who presided remarked that this was a very liberal offer, considering the rise which has taken place in the price of coal. It was decided to accept the offer.

THE PROPOSED TRANSFER OF THE BOURNEMOUTH GAS AND WATER WORKS.—Mr. J. C. Harvey, one of the promoters of the requisition calling upon the Bournemouth Town Commissioners to consider the question of the purchase of the gas and water works, has written to a local paper to say that the agreement submitted by the Commissioners does not commend itself to the majority of those who signed the requisition; so unfavourably, indeed, are the proposed terms generally regarded, that if the promoters of the requisition were to try to get a petition signed in favour of the agreement, the refusals would be so numerous as to practically make the task hopeless.

THE EXPENDITURE ON THE VYRNWY WORKS.—The Water Committee of the Liverpool Corporation have just issued the usual return of expenditure on the Vyrnwy works for the three months ending June 30 last. The totals for the period mentioned are given as follows:—Expenditure on the Llanwddyn embankment and works in connection with the lake, £5572; cost of quarrying at Llanwddyn, £3224; laying of pipe-line, £16,265; land and easements, £603—total for the quarter, £25,665. The net totals up to June 30 are: Embankment and reservoir, £517,867; quarrying, £191,393; pipe-line, £921,381; land and easements, £279,510—grand total, £1,910,152.

THE EIGHT-HOUR MOVEMENT AT BIRMINGHAM.—At a meeting last Sunday week of men employed in the Birmingham Corporation Gas-Works, the following resolution was passed:—"That this meeting of gas-workers and others hereby pledges itself to secure an improvement in the condition of the workers by working for a maximum working day of eight hours. As a means of obtaining this end, it now calls upon the Birmingham Town Council to at once establish a working day of eight hours for the gas stokers and other *employés* as already conceded by the London Gas Companies; and further urges them not to give out contracts to firms who do not give an understanding not to employ their hands more than eight hours per day."

THE PUBLIC LIGHTING OF WANDSWORTH.—According to the thirty-third annual report of the Wandsworth District Board of Works, which deals with the work carried out during the twelve months ending March 25 last, the number of lamps lighted in the district at the close of the previous financial year was 3045 ordinary and 41 large lamps supplied by meter. During the year the South Metropolitan Gas Company charged for lighting, &c., 38 public lamps £3 13s. 9d. per lamp, and for 1637 lamps £3 3s. 9d. per lamp. The Wandsworth and Putney Gas Company's charge was reduced from £3 18s. to £3 14s. 6d. The Mitcham Gas Company charged for lighting 24 lamps £5 4s. per lamp; and 188 lamps, £3 13s. per lamp (these latter being extinguished at midnight). The Brentford Gas Company charged for lighting 59 lamps £3 16s. 3d. per lamp.

ADDITIONAL STOREAGE ACCOMMODATION FOR THE DEVONPORT WATER COMPANY.—The Devonport Water Company are about to make a considerable outlay in enlarging their Crownhill storeage reservoir. Parliamentary powers for this purpose have been obtained, and will be put in force as soon as the necessary preliminary arrangements have been completed. The Company propose to lengthen the existing Crownhill reservoir a distance of nearly 500 feet in a northerly direction, to make this portion about 450 feet wide, and to raise the present walls about 2 feet. The capacity of the reservoir will be increased from something like 17 million gallons to from 45 or 46 million gallons. It is also contemplated to construct a small reservoir at Roborough, on land belonging to the Company, with a capacity of about a million gallons.

THE AGITATION AMONG GAS STOKERS.—The eight-hour system for gas stokers has spread to Woolwich, where a movement has commenced amongst the Arsenal gas stokers for securing the same hours of labour as those now adopted at the Beckton and other Metropolitan gas-works.

NELSON LOCAL BOARD WATER SUPPLY.—The Local Board of Nelson having failed to arrange terms with the riparian owners to send down the Black Moss stream a certain quantity of water, and thus avoid the construction of a compensation reservoir, as authorized by the Act of Parliament obtained last year, the Board have now decided to construct a reservoir at an estimated cost £10,000.

PROPOSED ELECTRIC LIGHTING OF THE FRIERN BARNET DISTRICT.—At a recent meeting of the Friern Barnet Local Board, Mr. Hennessy reported, in reference to the question of electric lighting for the district, that he had received a communication from an electric light company who were prepared to light the district with 28 arc lamps of 43-candle power, at a charge of £5 per annum for each lamp; the cost of erecting the necessary machinery and appliances being £1360, or at 7½ per cent. per annum for cost of maintenance and depreciation in plant, £142. The cost of lighting the district with 5 arc and 23 incandescent lamps would be about £3 10s. per lamp; outlay, £878; maintenance and depreciation, £96. The cost with 28 incandescent lamps would be: Outlay, £734; maintenance, &c., £116 16s., or about £4 10s. each. The arc lamps would be about 43-candle power; and the incandescent lamps, about 33-candle power. the expense of running the cable underground would be £200 more; the length of the cable being 1½ miles. A brief discussion ensued, in which it was pointed out that the Colney Hatch Gas Company might reduce their charges; and the Clerk was instructed to communicate with the Company and ascertain the terms upon which they were prepared to lay mains to a specified part of the district, the lamps to be placed 60 yards apart.

GAS AND WATER COMPANIES' STOCK AND SHARE LIST.

(For STOCK MARKET INTELLIGENCE, see *ante*, p. 352.)

Issue.	Share	When ex-Dividend.	Dividend or Div. & Bonus.	NAME.	Paid per Share	Closing Prices.	Rise or Fall in Wk.	Yield upon investment.
£			p. c.	GAS COMPANIES.				£ s. d.
590,000	10	11 Apr.	10½	Alliance & Dublin 10 p. c.	10	18½—19½	..	5 7 8
100,000	10	„	7½	Do. 7 p. c.	10	13—14	..	5 7 2
800,000	100	1 July	5	Australian (Sydney) 5% Deb.	100	109—111	..	4 10 1
100,000	20	30 May	10	Bahia, Limited	20	25—27	..	7 8 2
200,000	5	15 May	7½	Bombay, Limited	5	7—7½	+½	5 0 0
40,000	5	„	7½	Do. New	4	5—5½	..	5 9 1
380,000	Stck.	14 Aug.	12½	Brentford Consolidated	100	225—230*	+2	5 6 8
125,000	„	„	9½	Do. New	100	163—167*	..	5 10 9
220,000	20	14 Mar.	10½	Brighton & Hove, Original	20	43—45	..	4 13 4
320,000	20	28 Mar.	11½	British	20	45—47	..	4 15 9
50,000	10	14 Mar.	11	Bromley, Ordinary 10 p. c.	10	20—22	..	5 0 0
39,000	10	„	8	Do. 7 p. c.	10	13½—14½	..	5 10 4
328,750	10	30 May	10	Buenos Ayres (New) Limited	10	14½—15½	..	6 9 0
200,000	100	1 July	6	Do. 6 p. c. Deb.	100	106—109	..	5 10 1
150,000	20	14 Aug.	8	Cagliari, Limited	20	26—27*	+1	5 18 6
550,000	Stck.	11 Apr.	13½	Commercial, Old Stock	100	269—274	..	5 0 4
130,000	„	„	10½	Do. New do.	100	213—218	..	4 18 8
130,000	„	28 June	4½	Do. 4½ p. c. Deb. do.	100	122—125	..	3 12 0
557,320	20	14 June	13	Continental Union, Limited	20	46—48	..	5 8 4
242,880	20	„	13	Do. New '69 & '72	14	33—34	..	5 6 7
300,000	20	„	10	Do. 7 p. c. Pref.	20	37—39	..	5 2 6
75,000	Stck.	28 Mar.	10	Crystal Palace District	100	204—208	..	4 16 2
234,060	10	26 July	13	European, Limited	10	24½—25½	..	5 1 11
130,000	10	„	13	Do. New	7½	17—18	..	5 7 10
354,060	10	„	13	Do. do.	5	12—12½	..	5 3 9
5,470,040	Stck.	14 Aug.	13½	Gaslight & Coke, A, Ordinary	100	260—264*	+1	5 4 1
100,000	„	„	4	Do. B, 4 p. c. max.	100	100—105*	+2	3 16 3
665,000	„	„	10	Do. C, D, & E, 10 p.c. Pf.	100	253—258*	..	3 17 6
80,000	„	„	5	Do. F, 5 p. c. Prf.	100	123—128*	+½	3 18 1
60,000	„	„	7½	Do. G, 7½ p. c. do.	100	182—187*	+½	4 0 4
1,800,000	„	„	7	Do. H, 7 p. c. max.	100	166—171*	+½	4 1 10
463,000	„	„	10	Do. J, 10 p. c. Prf.	100	252—257*	..	3 17 9
1,051,150	„	14 June	4	Do. 4 p. c. Deb. Stk.	100	120—128	..	3 5 0
294,850	„	„	4½	Do. 4½ p. c. do.	100	126—130	..	3 9 8
650,000	„	„	6	Do. 6 p. c. do.	100	171—175	..	3 8 6
3,600,000	Stck.	15 May	10	Imperial Continental	100	210—214	+2	4 13 5
75,000	5	14 June	6	Malta & Mediterranean, Ltd	5	5—5½	..	5 9 1
560,000	100	1 Apr.	5	Met. of Melbourne, 5 p.c. Deb.	100	115—117	..	4 5 6
541,920	20	14 June	6	Monte Video, Limited	20	21—22	..	5 9 1
150,000	5	30 May	10	Oriental, Limited	5	9—9½	..	5 5 8
60,000	5	28 Mar.	7	Ottoman, Limited	5	6½—6¾	..	5 8 8
166,870	10	26 July	4	Pará, Limited	10	5—5½	..	7 5 5
				People's Gas of Chicago—				
420,000	100	2 May	6	1st Mtg. Bds.	100	103—107	..	5 12 1
500,000	100	1 June	6	2nd Do.	100	99—102	..	5 17 8
100,000	10	26 Apr	10	San Paulo, Limited	10	17½—18½	+1	5 8 1
500,000	Stck.	28 Feb.	16½	South Metropolitan, A Stock	100	320—325	..	5 0 0
1,350,000	„	„	12½	Do. B do.	100	242—247	..	4 18 2
141,500	„	„	18½	Do. C do.	100	260—270	..	4 18 1
600,000	„	28 June	5	Do. 5 p. c. Deb. Stk.	100	137—142	..	3 10 5
60,000	5	28 Feb.	11½	Tottenham & Edm'nton, Orig.	5	11—13	..	4 8 5
				WATER COMPANIES.				
717,467	Stck.	14 June	9½	Chelsea, Ordinary	100	273—278	+1	3 8 4
1,720,580	Stck.	11 Apr.	7½	East London, Ordinary	100	214—219	+2	3 8 6
544,440	„	28 June	4½	Do. 4½ p. c. Deb. Stk.	100	143—146	..	3 1 7
700,000	50	14 June	9	Grand Junction	50	127—133	..	3 8 2
708,000	Stck.	14 Feb.	10½	Kent	100	280—285	..	3 13 8
1,043,800	100	28 June	9	Lambeth, 10 p. c. max.	100	261—266	+2	3 7 8
406,200	100	„	7½	Do. 7½ p. c. max.	100	200—203	..	3 13 10
200,000	Stck.	28 Mar.	4	Do. 4 p. c. Deb. Stk.	100	120—123	..	3 5 0
500,000	100	14 Aug.	12	New River, New Shares	100	360-365*	+8	3 5 8
1,000,000	Stck.	26 July	4	Do. 4 p. c. Deb. Stk.	100	126—129	..	3 2 0
902,300	Stck.	28 June	6	S'thwk & V'xhall, 10 p.c. max.	100	181—186	..	3 4 6
1,126,500	100	„	6	Do. 7½ p. c. do.	100	168—173	..	3 9 4
155,066	Stck.	14 June	10	West Middlesex	100	267—272	..	3 13 6
						*Ex div.		

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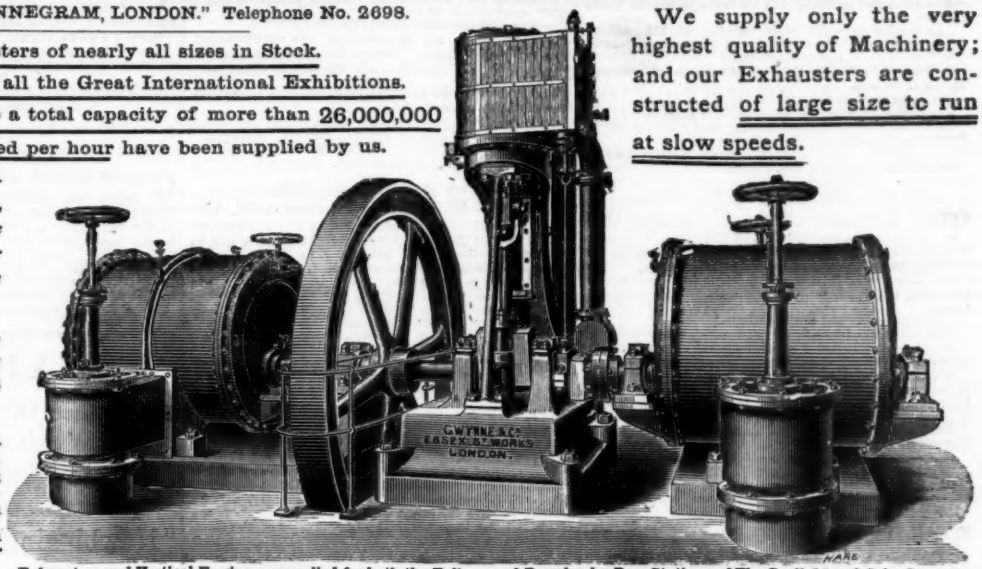

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*** See Advertisement p. 381 of this week's issue.

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THE Knutsford Light and Water Company invite TENDERS for their surplus TAR and AMMONIACAL LIQUOR, for a period of One year from the 1st of September.

The Company do not bind themselves to accept the highest or any tender.

Tenders to be sent in, not later than the 26th inst., to the Chairman of the Company.

LUDLOW GAS COMPANY.

THE Directors of the above Company invite TENDERS for the purchase of about 300 tons of TAR.

Tenders to be sent to the undersigned on or before Aug. 31.

The highest or any tender not necessarily accepted.
JAMES ELLIOTT, Manager.

TENDERS FOR TAR.

THE Directors of the Exeter Gaslight and Coke Company invite TENDERS for their surplus TAR for One year, from the 11th day of October next.

Delivery on Company's Works filled into Purchaser's Tanks.

Payments, cash monthly.

Sealed tenders, endorsed "Tender for Tar," will be received by the undersigned on or before Saturday, the 31st of August next; but the Directors do not bind themselves to accept the highest or any tender.

By order,
W. A. PADFIELD,
Secretary and Manager.

Gas Offices, 248, High Street, Exeter,
Aug. 1, 1889.

TO TAR DISTILLERS AND OTHERS.

THE Dover Gaslight Company invite TENDERS for the purchase of the surplus TAR produced at their Works for a period of Twelve months, from the 1st of October next.

The probable quantity will be from 60,000 to 80,000 gallons.

The tender to state price per ton of 200 gallons delivered into Trucks at a Railway Station in Dover or into Barges f.o.b. Dover Harbour.

Purchaser is to find Casks, and remove as required by the Company.

Terms of payment, monthly.

The highest tender not necessarily accepted.

Tenders to be sent, on or before Saturday, the 7th of September, marked "Tender for Tar," to

G. FIELDING, Secretary.

Dover Gaslight Company, Dover.

TO TAR DISTILLERS AND OTHERS.

THE Directors of the Gloucester Gas light Company invite TENDERS for the surplus TAR produced at their Works for One, Two, or Three years, from the 1st day of October next.

The Tar will be delivered into Boats or Barges at the Company's Wharf, on the Gloucester and Berkeley Canal.

Offers to be per ton of 200 gallons.

Payments, cash monthly.

Further particulars may be obtained on application to Mr. R. Morland, the Company's Engineer.

Sealed tenders, endorsed "Tender for Tar," and addressed to the Chairman, Gas Offices, Quay, Gloucester, to be delivered not later than the 28th day of August inst.

The Directors do not bind themselves to accept the highest or any tender.

By order,

WILLIAM E. VINSON, Secretary.

Gas Offices, Gloucester, Aug. 2, 1889.

TENDERS FOR GAS COAL.

THE Lighting Committee of the St. Mary Church (Devon) Local Board invite TENDERS for the supply and delivery of 1000 tons of approved GAS COALS, and 100 tons of CANNEL, to be delivered, during the next Twelve months, in such quantities and at such times as the Manager may direct, at either of the under-mentioned places—viz., *ex* Ship, Kingswere (Dartmouth Harbour), Torre Railway Station, or delivered (over the Weighbridge at the Works) into the Stores, free of all Charges.

Any further information may be obtained of the Manager.

The Committee do not bind themselves to accept the lowest or any tender.

Tenders should be sent in not later than the 31st inst., endorsed "Tender for Gas Coal," and addressed to the Chairman, Lighting Committee, Gas Offices, Barton Road, St. Mary Church, Torquay.

T. EVANS, Manager.

Gas Offices, St. Mary Church, Torquay,
Aug. 15, 1889.

CRYSTAL PALACE DISTRICT GAS COMPANY.

NOTICE is hereby given that the ORDINARY HALF-YEARLY GENERAL MEETING of this Company will be held at the Albion Tavern, Aldersgate Street, on Friday, the 13th day of September, 1889, to receive the Report of the Directors and the Balance Sheet, examined and signed by the Auditors, to declare a Dividend, and for General Purposes.

The chair will be taken at Three o'clock precisely.

By order of the Board,

MAGNUS OHREN, Secretary.

Aug. 17, 1889.

THE Directors of the Sheffield United Gaslight Company are prepared to receive TENDERS for a Brick and Cement GASHOLDER TANK, 187 feet diameter, by 41 ft. 6 in. deep, to be constructed at their Neepsend Station.

Drawings may be seen, and forms of tender obtained, upon application to the Engineer, Mr. Fletcher W. Stevenson, at the Company's Offices.

Tenders must be delivered to the undersigned, sealed, and endorsed "Tender for Gasholder Tank," not later than Wednesday, the 4th day of September next.

The Directors do not bind themselves to accept the lowest or any tender.

By order,

HANBURY THOMAS, General Manager.

Gas Company's Offices, Commercial Street,
Sheffield, Aug. 17, 1889.

COLNEY HATCH GAS COMPANY.

NOTICE is hereby given that the ORDINARY HALF-YEARLY GENERAL MEETING of the Proprietors of this Company will be held at the Company's Offices, New Southgate, on Thursday, the 5th of September next, at Six o'clock in the evening precisely, to receive the Report of the Directors and the Accounts of the Company for the Half Year ending the 30th of June last, to declare Dividends, and for other Purposes.

By order,

W. H. HARDY, F.C.A., Secretary.

Aug. 17, 1889.

BRIGHTON & HOVE GENERAL GAS COMPANY.

TO THE PROPRIETORS.

NOTICE is hereby given that the ORDINARY HALF-YEARLY GENERAL MEETING of the Proprietors of this Company will be held at the Company's Offices, No. 5, Great Winchester Street, London, on Friday, Sept. 6, 1889, at Two o'clock in the afternoon precisely, to receive the Report of the Directors and the Accounts of the Company for the Half Year ending the 30th of June, 1889, to declare Dividends, to elect Auditors, and for other Purposes.

The Transfer Books of the Company will be closed from the 23rd of August to the 6th of September, both Days inclusive.

By order,

W. H. HARDY, F.C.A., Secretary.

Offices: 5, Great Winchester Street,
London, E.C., Aug. 15, 1889.

TOTTENHAM AND EDMONTON GASLIGHT AND COKE COMPANY.

NOTICE is hereby given that the Annual ORDINARY GENERAL MEETING of the Shareholders in this Company will be held at the Company's Offices, Willoughby Lane, Tottenham, on Saturday, the 31st day of August inst., at Three o'clock in the afternoon precisely, to receive the Report of the Directors, the Statement of Accounts for the Half Year ended June 30, 1889, to declare Dividends for the same period, and for the election of two Directors and an Auditor for the ensuing year, and for transacting such other Business as the Act of Parliament directs.

The Transfer Books will be closed from the 16th to the 31st day of August, both Days inclusive.

Notice is hereby also given that an EXTRAORDINARY MEETING of the Shareholders will be held immediately after the Ordinary Meeting, to consider the propriety of converting the existing Shares into Stock.

By order of the Board,

JAMES RANDALL, Secretary.

Offices of the Company, Willoughby Lane,
Tottenham, Aug. 16, 1889.

NORTH BRITISH ASSOCIATION OF GAS MANAGERS.

THE Committee request those desirous of ADVERTISING in the ANNUAL REPORT OF PROCEEDINGS, 1889, to apply for Space to the Secretary.

Rates: Full pages, 21s.; half-page, 12s. 6d.

Priority of insertion will be given according to the order in which applications are received.

ROBT. S. CARLOW, Secretary.

Corporation Gas-Works, Arbroath,
Aug. 12, 1889.

Price 2s. per dozen, or 10s 6d. per 100, post free.

CONSPIRACY and Protection of Pro-perty Act. It is required, under a Penalty of FIVE POUNDS, that a Printed Copy of the 4th Section of this Act shall be posted up at all Gas-Works, in a conspicuous place, where the same may be conveniently read by the persons employed thereat.

Printed copies of this Section, in large type, on broad sheets, may be obtained of WALTER KING, 11, Bolt Court, FLEET STREET, E.C.

*** *The Act extends to Scotland and Ireland.*

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Gas Values, Discounts, Dividends, and Weights and Measures,

FOR USE IN GAS OFFICES.

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TO INVENTORS AND PATENTEES.
MR. W. H. BENNETT having had considerable experience in matters connected with Gas, Water, and Sanitary Improvement, begs to say that he continues to assist Inventors in the perfection of their designs, and to obtain for them PROVISIONAL PROTECTION, whereby their Inventions may be secured for Twelve months; or LETTERS PATENT, which are granted for Fourteen Years.
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Prices and Analysis on application.
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This Coal can be shipped from Hull, Goole Liverpool, Morecambe, and Barrow.

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SUITABLE FOR EVERY FORM OF LIGHTING.

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Awarded HIGHEST MEDAL and DIPLOMA at the Newcastle-on-Tyne Royal Mining and Industrial Exhibition, 1887, for

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TYNE BOGHEAD CANNEL.

Yield of Gas per ton	13,155 cub. ft.
Illuminating Power	38·22 candles.
Coke per ton	1,301·88 lbs.

EAST PONTOP GAS COAL.

Yield of Gas per ton	10,500 cub. ft.
Illuminating Power	16·3 candles.
Coke	70 per cent.

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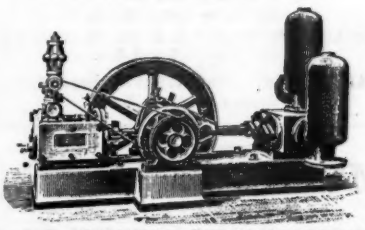

Fig. 685.—EVANS' Patent "RELIABLE" REVERSIBLE TAR and LIQUOR PUMP.

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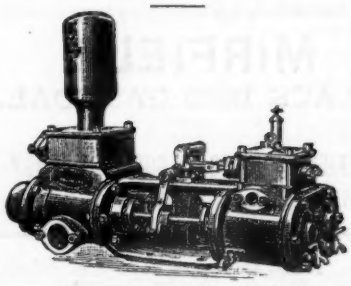

Fig. 670.—DUPLEX PUMP FOR GENERAL PURPOSES.

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ALDWARKE MAIN GAS COAL.

This Coal yields 12,600 feet of 16-candle gas per ton.

Weight of illuminating power in pounds of sperm, 820·80. Very free from impurities.

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Patent Saddle Back and Drilling Apparatus, whereby Gas and Water Mains can have 2-in. 3-in., 4-in., 5-in., and 6-in. Branches put on without loss of Water or Gas.

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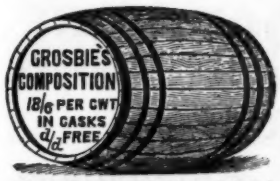

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Lamps giving 20-Candle Power consume less than 4-feet of Gas per hour.

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Suitable for any existing fittings (brackets or suspending). Can be fixed in a few minutes.

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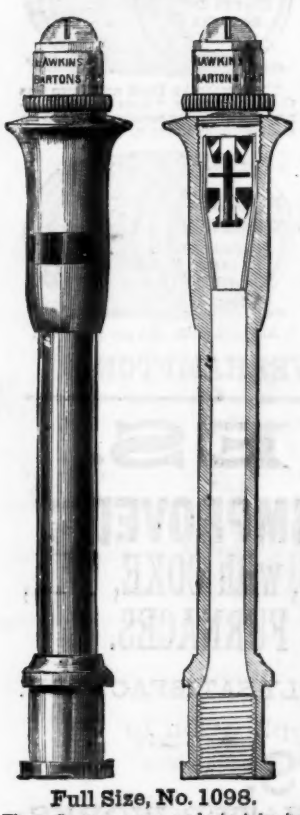

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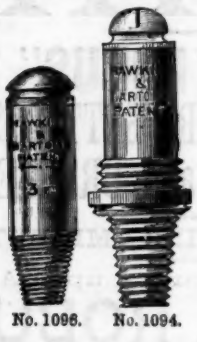

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By T. Newbiggino, Esq., C.E.
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Burner tested, 4 feet.
Pressure, 10, 15, 20, 25 tenths.
Consumption, 4, 4, 3·95, 3·8 feet.

By G. Bower, Esq, C.E.,
St. Neots, *March* 12, 1889.

"I have tested your Pressure Regulating Burners; and I find that those you sent me do not vary more than two-tenths under pressures varying from six to forty tenths. I shall not only use them myself, but I shall recommend others to use them."

By J. Mackay, Esq., Engineer, Gas-Works, Peterhead,
July 13, 1889.

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WATER GAS FUEL GAS

FOR INDUSTRIAL PURPOSES

GENERATED FROM

BITUMINOUS SLACK COAL

BY THE

LOOMIS PROCESS.

The Cheapest Gas-Generating System in the World.

NOVEL IN DESIGN.
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SIMPLE IN OPERATION.
PERFECT IN RESULTS.

PROCESS AND APPARATUS PATENTED IN ALL COUNTRIES.

By this system more gas, and of a higher heating power per cubic foot, can be generated from a ton of Bituminous Slack Coal than by any other from a ton of Anthracite Coal or Coke.

The successful application of Water Gas for industrial purposes was brought about through this Process at the Works of the—

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Many other industrial establishments in America are successfully using this Process, and a large number of Works are now being erected including a plant at Brussels and at Sheffield (at Messrs. Thomas Firth and Sons, Limited).

This process is especially adapted for firing all classes of Pottery, Tile, and Brick Kilns.

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BRECKENRIDGE CANNEL,

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The undersigned, SOLE AGENTS for this celebrated Gas Cannel, now offer it for delivery at any port in

GREAT BRITAIN,
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This Cannel ranks with the Australian Shale as an enricher of Coal Gas; One Gross Ton producing

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THE ORIGINAL (ESTABLISHED 1795). **WORTLEY FIRE-BRICK WORKS,**

NEAR LEEDS.

SPECIAL NOTICE.—Our Patent Machine-Made Retorts have now been thoroughly tested, and have proved themselves infinitely superior to those made by hand. At several large works it has been settled, beyond question, that, owing to the compactness and general excellence, more gas is sent to the gasholder from each ton of coal carbonized than is the case with hand-made Retorts.

AT THE PARIS EXHIBITION, 1878,
THREE MEDALS AND HONOURABLE MENTION
WERE AWARDED TO
JOSEPH CLIFF & SONS,
For their Various Exhibits, amongst which is a
SILVER MEDAL FOR THEIR PATENT MACHINE-MADE RETORTS AND FIRE-BRICKS,
Being the Highest Honour given for this Class.

London Wharf: No. 4, inside Great Northern Goods Station, King's Cross, N. Liverpool: Leeds Street.

TO GAS MANAGERS. SULPHATE OF AMMONIA PLANT.

CLIFF JOHN, & SONS, 7, WELLINGTON ST., LEEDS. Telegrams—"FIRE-BRICK, LEEDS." Works: "CLIFF, POTTERIES, RUNCORN."

FIRE-BRICKS & RETORTS.

N.B. This Firm will quote on application their Discount Price of all Fire-Clay Goods. "Leeds" and "Yorkshire" qualities.

CHEMICAL STONEWARE "The best" for resisting Acids.

TAPS SEND FOR PRICE LIST.

"LIGHT, **Wenham Gas Lamps** MORE LIGHT."

ITS ADVANTAGES ARE:

IMMENSE ECONOMY IN THE CONSUMPTION OF GAS.

INTENSITY, PURITY, AND STEADINESS OF THE LIGHT.

Absence of Downward Shadow. Practical Completeness of Combustion.

CAN BE FITTED TO ORDINARY SUPPLY-PIPES WITHOUT ALTERATION.

CAN BE USED AS VENTILATING LIGHTS, whereby the products are removed, and damage to decorations, &c., prevented.

SOLE PROPRIETORS AND MANUFACTURERS: **THE WENHAM COMPANY, LIMITED.**

Birmingham Branch: 121, CORPORATION STREET. Works: UPPER OGLE ST., LONDON, W. Manchester Branch: 5, DEANSGATE.

R. DEMPSTER & SONS, Ltd.,

ESTABLISHED 1855.

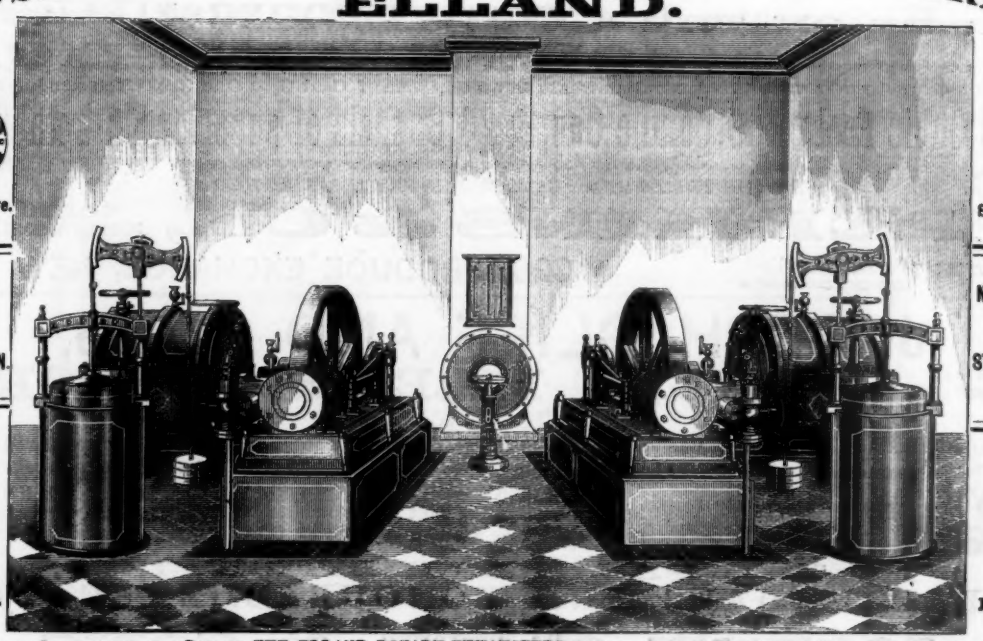
ROSE MOUNT GAS ENGINEERING WORKS, ELLAND.

No. 1. Flange Valve.

NO SLIP.

NO OSCILLATION.

No. 3. Screw Valve.



No. 5. Screw Valve.

NO HIGH SPEED.

STEADY GAUGE.

No. 6. Disc Valve.

THE ABOVE IS AN ILLUSTRATION OF A PAIR OF THE ELLAND ROTARY EXHAUSTERS ERECTED BY US AT WIGAN, EACH OF WHICH ARE CAPABLE OF PASSING 80,000 CUBIC FEET OF GAS PER HOUR.

Makers of every other description of Gas Plant, including Retorts, Retort Mountings, Condensers, Washers, Tar and Liquor Separators, Scrubbers, Purifiers, Gasholders any size, Patent Centre-Valves, Four-Way Valves, Rack, Screw, and other Valves.

Testimonials and References on Application to

DEMPSTERS', ELLAND.

MORRIS & CUTLER'S
"Perfect" Condenser.

Messrs. CUTLER are now constructing for the

MELBOURNE METROPOLITAN GAS COMPANY

A "PERFECT" CONDENSER,

CAPACITY 5,000,000 CUBIC FEET PER DIEM.

One of these successful Condensers, capacity 2,000,000 cubic feet per diem, has been in use at the above Works for several years.

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SAMUEL CUTLER & SONS,

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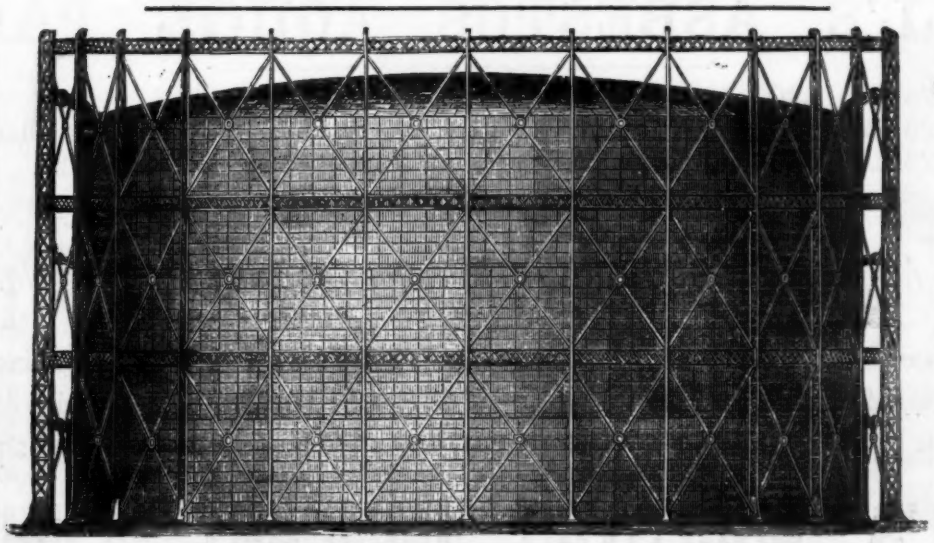
W. C. HOLMES & CO.,

ENGINEERS & CONTRACTORS FOR GAS-WORKS,

WHITESTONE IRON-WORKS, HUDDERSFIELD,

And 80, CANNON STREET, LONDON, E.C.

GASHOLDERS of Improved Construction.



Tar, Sulphate, Muriate, and Liquid Ammonia Plants.

MAKERS OF

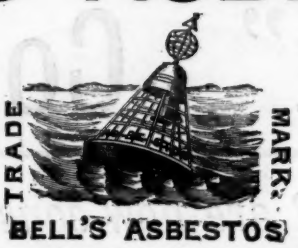
IMPROVED CONDENSERS, SCRUBBERS, AND WASHERS;

PURIFIERS with PLANED JOINTS; CENTRE-VALVES TO WORK ALL FOUR PURIFIERS; EXHAUSTERS;

AND ALL APPARATUS and FITTINGS used in GAS MANUFACTURE.

BELL'S ASBESTOS

AQUOL PAINT



IS MADE READY FOR USE.

IS FIRE RESISTING.
IS WASHABLE.
IS NON-POISONOUS.
IS MANUFACTURED IN ALL USEFUL COLOURS.
IS IMPERVIOUS TO HEAT, COLD, OR WATER.
IS WITHOUT SMELL.

No expensive Oil or Turpentine required.

WILL NEVER BLISTER.

HAS A COVERING CAPACITY 40 PER CENT. GREATER THAN LEAD PAINTS.

For Outside or Inside Work in any Climate.

Bell's Asbestos Aquol Paint is equally suitable for the finest decorative work as well as for general painting. It can be applied over or under any other paint, and, owing to its easy application, can be used with a large distemper brush; the SAVING THUS EFFECTED IN LABOUR BEING **50** PER CENT. OVER THAT OF LEAD PAINTS.

Bell's Asbestos Aquol Paint is susceptible of the most delicate treatment; and, owing to its perfect flatted surface, it brings up the varnish in a manner that no other paint can equal. ONE COAT OF VARNISH ON **Bell's Asbestos Aquol** IS EQUAL TO TWO COATS ON ORDINARY PAINT.

BELL'S ASBESTOS AQUOL PAINT is specially adapted for Private Houses, Exhibition Buildings, Ships, Churches, Asylums, School Boards, Railway Stations, and all work of Wood, Iron, Cement, Plaster, Stone, Brick, &c., &c.

Those who Study Economy and Protection from Fire should use only

BELL'S ASBESTOS AQUOL PAINT.

BELL'S ASBESTOS AQUOL PRIMING is made Ready for Use.
BELL'S ASBESTOS AQUOL PRIMING stops all suction of Wood, Cement, Plaster, &c.
BELL'S ASBESTOS AQUOL PRIMING should be applied to all New Work.

Suitable for Ceilings, Walls, and New Wood, and is very durable.

BELL'S ASBESTOS AQUOL KNOTTING, for Stopping Knots in New Work.

AN EXCELLENT CURE FOR DAMP WALLS.

Colour Cards and Price Lists on Application.

Supplied in Casks of 5 to 7 cwt., and Iron Drums of 28, 56, and 112 lbs., Sample Tins of 7 and 14 lbs.

Owing to its Covering Capacity, a SAVING IN FREIGHT of 40 per cent. is effected for a given surface.

BELL'S ASBESTOS COMPANY, LIMITED,

SOUTHWARK, LONDON, S.E.

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CARDIFF: West Bute Street. BIRMINGHAM: 7, John Bright Street. HULL: Humber Dock Basin.
GLASGOW: 35, Robertson Street. DUBLIN: 2, St. Andrew Street. BERLIN and BARCELONA.

BELL'S ASBESTOS

EXPANSION SHEETING.

The above, which can only be obtained from this house, is recognized as the **most efficient and economical jointing material in use.** It is composed of a specially-prepared India-rubber Compound, protected by a covering of Vulcanized Asbestos Sheeting, as shown above; and as it is the only Jointing Material which adequately **combines permanent elasticity with heat resistance,** the advantage it possesses will at once be seen.

EXPANSION RINGS.

The centre from which the requisite elasticity is obtained will adapt itself to uneven surfaces to which it may be applied, and allow the expansion and contraction to be fully taken up. The covering being of Asbestos Cloth imparts a protection to the centre, and so prolongs its elasticity. **For Manhole, Mudhole, Steam Pipe, and Mash Tun Door Joints, it is unequalled;** and if applied as directed, **a ring can be used many times over.**

Made from 1-Ply for Cylinder and Faced Joints to any thickness for Uneven Surfaces.

BELL'S ASBESTOS CO., Ld.

DEPÔTS.

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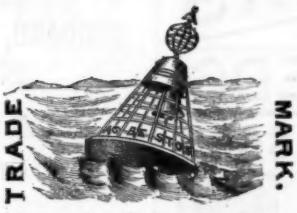
HULL: Humber Dock Basin.
DUBLIN, BERLIN.



DEPÔTS.

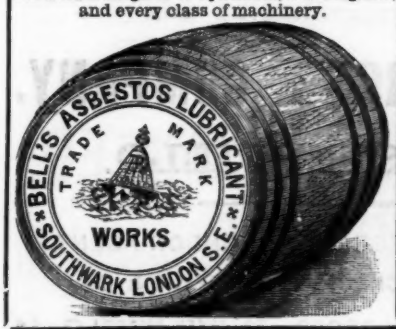
BIRMINGHAM: 7, John Bright Street.
GLASGOW: 35, Robertson Street.
CARDIFF: West Bute Street.
And BARCELONA.

Southwark, London, S.E.

BELLS ASBESTOS
YARN AND SOAPSTONE PACKING
Is the BEST LOCOMOTIVE PACKING made.

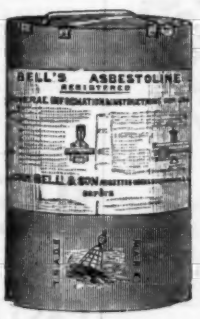
BELL'S
COMPOUND HYDRAULIC PACKING
Is specially suited for
Hydraulic Machinery, Accumulators, and Ammonia and all Pumps.

BELL'S ASBESTOS LUBRICANT
Is unequalled
For Steam-Engines & Cylinders, Gas-Engines, and every class of machinery.



BELL'S ASBESTOLINE
The reputation of this Lubricant is based on the experience of thousands of users, which places it far in advance of those who rely only on mere laboratory tests.

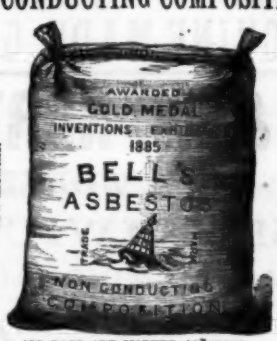
ASBESTOLINE IS THE CHEAPEST, MOST EFFICIENT, CLEANEST, MOST INODOROUS AND SAFEST LUBRICANT.



ASBESTOLINE HAS SAVED 90 PER CENT. OVER OIL. Has been used for all purposes, AND BEATEN ALL OTHER LUBRICANTS IN ACTUAL WORK.

BELL'S ASBESTOS
"DAGGER" PACKING
Is unequalled for every kind of Marine and Land Engine, Steam-Pumps, &c., and has proved itself to be the most efficient, durable, and economical Packing made.

BELL'S ASBESTOS
NON-CONDUCTING COMPOSITION.
Will reduce loss by radiation, and saves 40 per cent. of fuel.
Is superior to any other, and saves its cost in a few months.



Can be applied again after many years' service. Is sent out dry in bags; therefore cheaper than others sent out wet.

ALL BAGS ARE MARKED AS ABOVE.

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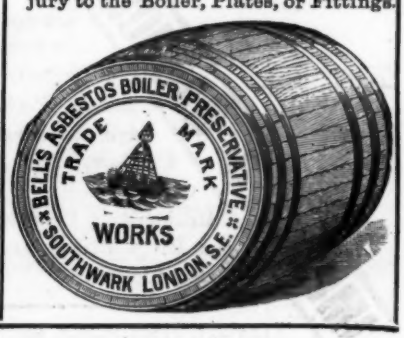
BOILER PRESERVATIVE
Will effectually keep Boilers clean, and remove any Incrustation, without injury to the Boiler, Plates, or Fittings.



"THE METEOR."

NEW HIGH-POWER GAS-LAMP, WESTPHAL'S PATENT.
MOST INTENSE WHITE BRILLIANT GAS LIGHT.
MOST ECONOMICAL, SIMPLE, AND DURABLE.
DOES NOT GET OUT OF ORDER.
RIVALS THE ELECTRIC LIGHT.
NO ALTERATION REQUIRED TO EXISTING FITTINGS.
BURNER, BEING A CIRCULAR SLIT DOES NOT CHOKE UP.

PARTICULARS & PRICES POST FREE.

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GAS PLANT
OF EVERY DESCRIPTION.
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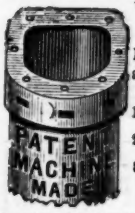
HUNSLET, LEEDS.

WILLIAM INGHAM & SONS,

WORTLEY FIRE-CLAY WORKS,
Near LEEDS,



Have confidence in drawing the special attention of GAS ENGINEERS to the following advantages of their Retorts:—

1. Smooth interior, preventing Adhesion of Carbon.
2. They can be made in one piece up to 10 feet long.
3. Uniformity in thickness, ensuring equal Expansion and Contraction.

PATENT
MACHINE-MADE GAS-RETORTS.

J. & W. HORTON

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SMETHWICK,
NEAR BIRMINGHAM
(Established 50 Years),

PATENTEES
AND
MANUFACTURERS
OF

IMPROVED GASHOLDERS AND BOILERS

and Manufacturers of every description of

Gas Apparatus,

Cast and Wrought Iron Tanks, Purifiers, Condensers, Scrubbers, Retort-Lids, Cross-Bars and Screws; Wrought-Iron Boilers for Stationary, Portable, and Marine Engines, Sugar Pans, Coolers, Clarifiers, Punts, Boats, Bridges, Girders, Roofs, Cisterns, Oil-Tanks, Melting-Pots, Crucibles, Salt-Pans, Arch and Range Boilers, and every description of General Ironwork.

Drawings, Specifications, and Estimates supplied.

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MANUFACTURERS OF FIRE-BRICKS, LUMPS, TILES,

AND EVERY DESCRIPTION OF FIRE-CLAY GOODS.
RETORTS CAREFULLY PACKED FOR SHIPMENT.
A STOCK OF DIFFERENT SHAPES ON HAND.

SULPHATE OF AMMONIA.

By Her Majesty's Royal Letters Patent.

DR. FELDMANN'S APPARATUS

The most successful and approved Apparatus known up to the present time.

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CASTINGS OF EVERY DESCRIPTION.

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AND ALL KINDS OF GAS AND WATER WORKS PLANT.

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Supply to any Railway Station, or for Export, all kinds of Fuel for Gas purposes.

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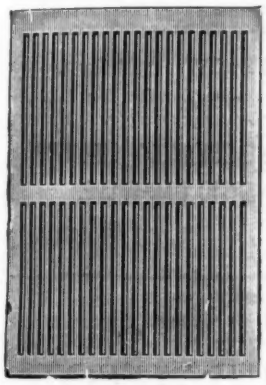

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Made from any kind of Timber, of any Size or Shape, by trained Workmen and specially-designed Machinery.

Quick delivery and accuracy guaranteed.

BOARDS FOR SCRUBBERS

Cut and fitted upon the most successful system.

GRIDS FOR SULPHATE PLANTS.

Prices moderate. Inquiries solicited. Estimates free.

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GAS PLANT WORKS,

NEWTON HEATH, MANCHESTER.

THE "LUCIENT" HIGH-POWER & DURABLE GAS-LAMP.

ALEXANDER BROWN'S PATENT.

Gives the most intense, brilliant, and steady white light yet produced from gas. A light of over 270 candles for 13 cubic feet per hour. Such results are unapproached by any other Regenerative Gas-Lamp. To be seen in operation, and full particulars obtained of

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FOR

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IN THE

VICINITY OF GAS-WORKS,

MIXED READY FOR USE.

This PAINT is not affected by Sulphuretted Hydrogen, Damp or Impure Air, and is specially recommended to

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Patterns and full Particulars Post Free. Quotations for Quantities.

THE "LA BELLE" ENAMEL,

Specially prepared for Engine-Beds and Machinery of every description. Stands the action of Mineral Oils, Heat, Gases, &c. Dries hard with a glass-like surface.

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LA BELLE SAUVAGE YARD, LUDGATE HILL,

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GAS WORKS Designed & Constructed ABROAD AND AT HOME
MAKERS OF LARGEST GAS HOLDER IN THE WORLD
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CONDENSERS, PURIFIERS, TOOLS
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Engineers, Ironfounders, and Contractors,

ALBION IRON-WORKS, MILES PLATTING, MANCHESTER,

MANUFACTURERS OF

WEST'S PATENTED MACHINERY

FOR

CHARGING AND DRAWING GAS-RETORTS.

OVER **160** MACHINES AT WORK AND IN COURSE OF CONSTRUCTION.

ADVANTAGES ATTENDING ITS USE ARE:—

INCREASED VOLUME of GAS per TON and INCREASED YIELD per Retort.—The system of breaking and distributing the coals in an even layer in the retorts effecting more perfect carbonization.

REDUCTION in LABOUR and COST of WORKING.—In Works where this System of charging and drawing Retorts is adopted, there has been effected a substantial saving in the cost of Gas Manufacture in the Retort-House; the amount saved varying in different Gas-Works from **8 PENCE** to **15 PENCE** per Ton of coal carbonized. Full particulars will be forwarded upon application to W. G. I. Company, Limited.

MANUAL CHARGING AND DRAWING MACHINES.

POWER CHARGING AND DRAWING MACHINES, driven by **Wire Rope, Steam, or Compressed Air.**—The power machines are applicable to circular, oval, or Ω-shaped retorts and mouthpieces, and are the most perfect, economical, efficient, and durable machines made; they are constructed on principles founded by long and extensive experience in this special branch of gas engineering and the manufacture of gas.

Sole Makers of **CIRCULAR, OVAL,** or Ω-shaped **MOUTHPIECES,** with Morton's Self-Sealing Lids, fitted with

KING'S PATENT FASTENINGS,

which, by a simple wedging action at each end of the crossbar, secure a very tight joint; and as the same time, by their long sliding motion, they effectually remove the tar or other matter from the surfaces of the mouthpiece and lid.

N.B.—The whole of these Fittings are made of Wrought Iron.

Estimates and further particulars forwarded upon application for Mouthpieces complete, or for Lids and Fastenings separately.

MAKERS OF THOMAS AND SOMERVILLE'S COKE-BREAKING MACHINE.

SOLE MAKERS OF WHITE'S PATENT AUTOMATIC GAS-VALVE.

Mr. JOHN WEST, M. Inst. C.E., Managing Director.

ILLUSTRATED CATALOGUE SENT UPON APPLICATION.

G. J. EVESON,

GAS COAL AND CANNEL CONTRACTOR,

PATENTEE OF

A SPECIAL COMPOUND

FOR THE CURE OF STOPPED ASCENSION-PIPES,

A couple of charges of which will clear a stopped pipe, and an occasional charge keeps them clean, and also increases the make per ton and the illuminating power.

PRICE AND PARTICULARS ON APPLICATION.

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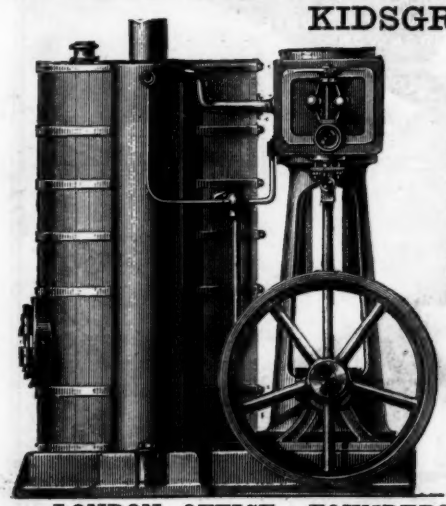
RENSHAW, KING, & Co.,

KIDSGROVE, STAFFORDSHIRE,

Sole Makers and Licensees



VICTOR VACUUM ENGINE

(WASTFIELD'S PATENT),

PRIME MOVER, suitable for Tram Cars, Yachts, Hoists, Dynamos, Pumps, and Driving Machinery in Gold Mining, Crushing, Grinding, Cutting, Printing, Ventilating, Farming, &c., &c.

ADVANTAGES: Cost of Fuel **ONE FARTHING** per hour per horse power. **50 PER CENT.** less than Gas-Engines. Absolute safety. Entirely Automatic. Only attention required being for fire at long intervals.

ANY FUEL CAN BE USED.

Furnishes abundance of hot water for heating or other purposes, without affecting motive power.

IS PRACTICALLY NOISELESS, NO SMELL, SMOKE, OR NUISANCE.

PRICE: Half-H.P., £54. 1-H.P., £73. 2-H.P., £105.

AND OTHER SIZES IN PROPORTION.

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